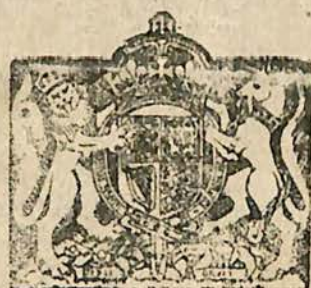


HISTORY OF THE SUPPLY DEPARTMENT

(1939—1946)



BY

RAI SAHIB S. C. AGGARWAL

B.A. (Hons.), Dipl. Min. Econ. (Leeds), F.G.S. (London),

*Deputy Secretary to Government of India, Department of Labour,
Industries and Supplies Department*

AUTHOR OF "THE B. A. CALCULUS", "THE SALT INDUSTRY IN INDIA", etc.



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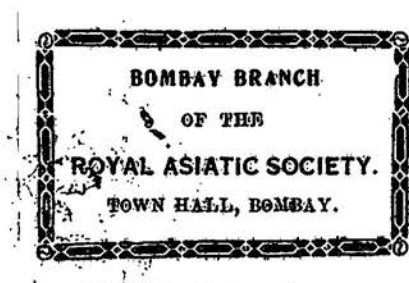
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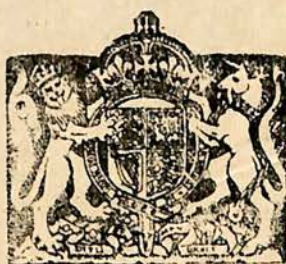
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Rai Sahib S. C. AGGARWAL

PREFACE

Surely one of the strangest things in military history is almost complete silence upon the problem of Supply. Not in a hundred books written on war is there to be found one on this subject. Yet, this forms the basis on which rests the whole structure of war. For example, examine the most epoch-making war ever fought, namely the conquests of Alexander the Great. Though with a great army he marched 22,000 miles, we are not told how he supplied or fed it. So also with the campaigns of Hannibal and Caesar, the problem of supply is barely mentioned. Not until the eighteenth century do military writers show any marked interest in the subject and then very theoretically. At length Napoleon gives expression to the fundamental principle that "an army marches upon its stomach". Turning now to the times in which we live, the first World War showed us how immense the supply problem is, in fact, it may be called a war between two great supply systems. Napoleon's fundamental principle is not only as true as ever but must remain so long as war endures.

It will be no exaggeration to say that year 1945 will go down in history as one of the most momentous in the annals of Man. Its momentousness will, of course, arise from the fact that it witnessed the termination of the most devastating war the world has ever known, a war global in its dimensions and lasting about six long years. The historians of the future in recording the happenings of World War II will report the feats of valour on land, on sea and in the air that ultimately led to Allied Victory. But it is essential to record at the same time the feats of production in allied factories and workshops by which the soldiers, the sailors and the airmen were supplied with the tanks, the guns, the ships and the aeroplanes that wrought havoc on the foe. It is also important to record the skill, the speed and the efficiency of the captains and soldiers of industry with the same meticulous care as the skill displayed in the planning of military campaigns and the dauntless courage with which they were implemented. The pages that follow will give a glimpse of the feats of production in the Indian factories and an idea of the performance of the Indian industry in the supply field.

Supply in this mechanised war has presented one of the greatest problems. India has good cause to be proud of the contribution her men and women have made in the land, sea and air fighting of this war. Indian industry too responded to the call with the same enthusiasm and devotion that characterised the young men of this land who volunteered for active service anywhere. At the outbreak of war, our industries, established—as were all factories of the United Nations—for the pursuit of peaceful trade, directed their endeavours to the grim business of war. At first their output was but a mere trickle, but as the months passed, the flow of war materials, of supplies, of essentials to arm and sustain men on the battlefields, grew into a mighty flood. The value of India's industrial contribution to the united war effort can never be fully computed.

During World War I, the Indian Munitions Board which was a mere bagatelle compared to the Supply Department constituted the main Supply Organisation. A Hand Book was published by it, but it only touched upon the general industrial development in India during the war. I felt that if an attempt were made to give the History of the Supply Organisation—its evolution, growth, problems and work after the war, it would be a very difficult task indeed. Thinking that after the war there would be a natural revulsion against anything connected with the war, I set to work on collection of material

soon after joining the Department in December 1942 and have been devoting all my spare time, sundays, holidays and leave to it. The material has been collected from thousands of office files, office and administrative orders issued by the various units of the Department, Memoranda, Reports and Brochures. Of the printed literature, Dr. Thomas' two reports "Development of Industries for War Supplies" were of much use especially in connection with the Industrial Developments detailed in Part III. Help was also taken from reports of various Missions such as, the Roger Mission, the Grady Mission, U. K. Machine Tool Mission, Fertilizer Technical Mission, Pink reports etc. A list of all books referred to has been given under 'Bibliography'. Moreover, material was also collected from current periodicals, Indian and foreign publications, publications by Industries and Supplies Departments in the U. K., the Empire Countries and the U. S. A.

The work has been divided into five parts:—

Part I shows the progressive evolution of the Supply Organisation from very humble beginnings. Starting from the Supply Organisation during the first world war, a historical survey has been attempted of the pre-war organisations on which it drew when it started. Later, the gradual evolution and growth of the organisation and how it had to adapt itself to the changing character of the war have been brought out and in the end it has been shown what the organisation was like at its peak, i.e., on V-J Day. Some account has also been given of other organisations—Supply Finance and Supply Accounts—intimately connected with it.

Part II deals with problems and difficulties that the Department had to face, the measures taken to deal with them; how the changing war conditions imposed greater and greater responsibilities on the Supply Organisation and it had to re-orient its policy from time to time; how the ordinary peace-time tender system proved inadequate and negotiations had to be resorted to; how profits and prices were controlled; why it became necessary to impose controls and how they were administered; how the capacity of the country was augmented with the measures suggested by the Roger and the American Technical Missions; how Lease-Lend came to our rescue; how the war supplies were financed, what the effect of huge war purchases on Indian economy was and what anti-inflation measures were taken by the Department; how the industries were developed, and what difficulties were presented by the dearth of technical personnel and the shortage of coal and transport.

Part III describes the steps taken to gear the Indian economy to war production and the developments that took place in all important industries.

Part IV is of general interest. It gives an idea of War Supplies made to Eastern Group and other overseas countries; Indian States contribution; policy and procedure of registration of contractors; war-time adventures in industry, etc.

Part V deals with the after-math of the war, problems of transition and re-conversion, liquidation of war contracts, and the disposal of war surpluses. Mention has also been made of how the Supply Department has given birth to a new organisation bringing back to its fold the I. & C. S. Department and absorbing the Planning and Development Department. Under 'Conclusion' an attempt has been made to place on record our experiences in War production and supplies so that future planners may profit by the mistakes we made, the difficulties we encountered and the steps we took to overcome them.

In short, the book shows the extent to which manpower and resources were mobilised and the manner in which they were organised for war production, the immense contribution made by the country and the remarkable output of arms and munitions and general stores achieved. Those who read this record will get an idea of the industrial achievements of Indians in these six war years. And from these pages, too, they may get a glimpse of something of what India can and will become now that the war clouds have passed away.

I must, however, confess that in writing this book, I have suffered from many limitations. In the first place, my own incompetence has set obvious limits to my efforts for which I crave the indulgence of those who know better. Secondly, the bewildering rapidity with which changes occurred in the Supply Organisation imposed ever increasing difficulties on me. It was very difficult indeed to keep unbroken track of the numerous channels through which this gigantic organisation constantly tapped the resources of the country. Volumes could be written on each of the different aspects of the Supply Department, but I could devote no more than a limited attention to the topics dealt with in the Book. All that I claim is that I have attempted to show the main lineaments of the picture.

I would like to record my gratitude to Mr. M. W. M. Yeatts, Secretary, Industries and Supplies Department, for his constant support, sympathetic advice and criticism which in a work of this kind are invaluable; in addition, he very kindly scrutinised several chapters of the Book and mainly due to his interest in this work, I was finally placed on special duty for about two months for completing the work; this period was most helpful as it enabled me to discuss the contents of the Book with senior officers and to get some portions scrutinised by those with special knowledge of various subjects.

In the earlier stages of my work, from 1943 to 1945, I received much kindness and encouragement from Sir Ramaswamy Mudaliar and Sir Arthur Waugh, to whom also I offer my sense of gratitude.

I would also like to record the considerable debt which I owe to Messrs. Ikramullah, Bhoothalingam and Nayak who went through large portions of the book and offered valuable suggestions from time to time.

My thanks are also due to several other officers, particularly Sir Robert Targett, Messrs. Venkataraman, Mohammad Ali, Desai, Nehru, Chanda, Thadani, Mukerjee, Naqvi, Lamarque, Bhattacharya, Po Saw, Narayanan, Ratnam, Ayub, Jha and Thomas who gave valuable suggestions from time to time and commented on some of the chapters. I am also indebted to Sir Thomas Borwick, Air Vice-Marshal Carter, Messrs. Mathews, Whittle and Lamarque whose notes in respect of their organisations were of considerable help. Much useful information was also obtained from Tyson's "India Arms for Victory".

Mr. Hit Prakash Basil, stenographer, also deserves thanks for having done most of the shorthand and typing work ever since 1st January 1943.

While I have collected most of my data from departmental records (files, brochures, reports, etc.), any views contained in the book are my own as an individual observer and should not be treated as those of the Supply Department or Government or of the officers who have scrutinised and commented on the manuscript.

S. C. AGGARWAL.

NEW DELHI;

The 9th October 1946.

ABBREVIATIONS

A. H. F. A.	Additional Financial Adviser.
A. Os.	Administrative Officers.
A. W. M.	Assistant Works Manager.
B. S. I. R.	Board of Scientific and Industrial Research.
C. M. U.	Civil Maintenance Unit.
C. R. Os. (M. T.)	Civil Repair Organisations (Mechanical Transport)
C. A. F. A.	Controller of Army Factory Accounts.
C. C. F. A.	Chief Controller of Factory Accounts.
C. S. A.	Controller of Supply Accounts.
C. C. S. A.	Chief Controller of Supply Accounts.
C. I. F.	Cost, Insurance and Freight.
C. G. I.	Controller General of Inspection.
C. C. P. (S)	Chief Controller of Purchase (Supply).
C. C. P. (M)	Chief Controller of Purchase (Munitions).
C. R. O.	Chief Registration Officer.
C. A. O. (P)	Chief Administrative Officer (Purchase).
A. O. (AP)	Chief Accounts Officer (American Purchases).
C. R. M. B.	Combined Raw Materials Board.
C. L. C. F. A.	Controller of Leather and Clothing Factories Accounts.
O. O. F. A.	Controller of Ordnance Factories Accounts.
C. A. P.	Civil Armaments Production.
C. S. I. R.	Council of Scientific and Industrial Research.
C. P. W. D.	Central Public Works Department.
C. L. A. C.	Central Lubricants Advisory Committee.
C. C., I. S. D.	Chief Controller, Indian Stores Department.
CX Dte.	Cotton Textiles Directorate.
C. B. R.	Central Board of Revenue.
Dy. C. C., I. S. D.	Deputy Chief Controller, Indian Stores Department.
D. D. O. S. P.	Deputy Director of Ordnance Services (Provision.)
D. C. C. D.	Deputy Coal Commissioner (Distribution).
D. C. C. (P)	Deputy Coal Commissioner (Production).
D. S. I. R.	Director of Scientific and Industrial Research.
D. O.	Development Officer.
D. G. S. R.	Director General, Shipbuilding and Repairs.
D. G. A.	Director General, Aircraft.
D. G. M. P.	Director General, Munitions Production.
D. G. S.	Director General, Supply.
D. G. D.	Director General, Disposals.
D. G. S. & D.	Director General, Salvage and Disposals.
D. I. & S. C.	Deputy Iron and Steel Controller.
D. S.	Deputy Secretary.
E. P. T.	Excess Profits Tax.
E.-in-C.	Engineer-in-Chief.
E. G. Countries	Eastern Group Countries.
E. G. S. C.	Eastern Group Supply Conference and Eastern Group Supply Council.
F. A. M. F.	Financial Adviser (Military Finance).
F. D. (O. B.)	Finance Department (Ordinary Branch).
H. M. G.	His Majesty's Government.
H. A. L.	Hindustan Aircraft, Limited.
I. J. M. A.	Indian Jute Mills Association.

I. G.	Imperial Gallons.
I. & S. C.	Iron and Steel Controller.
I. S. D.	Indian Stores Department.
I. & C. S. Deptt.	Industries and Civil Supplies Department.
I. & S. Department	Industries and Supplies Department.
M. W. T. (UK)	Ministry of War Transport (United Kingdom).
M. C. Notes	Military Credit Notes.
M. A. G.	Military Accountant General.
M. T.	Military Transport.
M. G. O.	Master General of the Ordnance.
M. E. S.	Military Engineering Service.
M. O. S. M.	Ministry of Supply Mission.
M. I. O.	Mathematical Instruments Office.
N. C. E. R. A.	Net Cost Emergency Repairs Agreement.
O. G. L.	Open General Licence.
O. F. E.	Ordnance Factories Expansion.
P. A. O.	Principal Administrative Officer.
P. S. O. C. (I)	Principal Supply Officers' Committee (India).
P. O. L.	Petroleum.
Q. M. G.	Quartermaster General.
R. E. D.	Repairable Equipment Depot.
R. I. N.	Royal Indian Navy.
R. A. F. (M. T.)	Royal Air Force (Military Transport).
R. I. A. S. C.	Royal Indian Army Service Corps.
S. S. I.	Small Scale Industries.
S. E. A. C.	South East Asia Command.
S. A. A.	Small Arms Ammunition.
T. P.	Transplantation.
W. R. C. C.	War Resources Committee of Council.
W. M. & P. Deptt.	Works, Mines and Power Department.

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PART I—ORGANISATION

INTRODUCTION

Soldiers need some 60,000 different kinds of articles to fight in battle. The major portion consists of weapons, ammunition, ordnance stores, food and clothing. If the army is mechanised, vehicles, vehicle components and stores make up the remainder. Modern war requires enormous quantities of these articles which the Supply Organisation has to arrange. India had not only to meet the requirements of her own defence needs but had also to make certain supplies to His Majesty's Dominions, Allied and Colonial Governments.

The shortage of one article may hold up the production of a hundred. Bottlenecks like raw materials, plant and machinery, labour, transport, etc., may seriously affect. Moreover, time presses and supplies have to be arranged for operational and urgent needs. It is no simple task to convert and expand a country's industrial capacity from the relatively simple needs of peace to the specialised and ever-changing demands of war. Above all, war is never static. No war production plan can achieve ultimate balance and standardisation. The secret weapon of today is the obsolete weapon of tomorrow. The munitions programme aims at its own dissolution and is subject to subtractions and additions, to expansions and contractions, in direct relation to its own success. All human and material resources of a country have to be planned into production on a gigantic scale. All these complexities are inevitably reflected in a Supply organisation.

As soon as the war broke out, India had to create a Supply Organisation to grapple with all these problems. In a democracy, the effective mobilisation of men and machines for the production of war goods can be achieved only by the development of an enlightened and efficient system of a direct State control of industry and trade. Such a regulatory system with all that it implies cannot be created by one bold stroke of the Executive Council's pen, powerful as it is. On the declaration of war a complete Supply organisation could not spring into being all of a sudden. No such miracle occurred anywhere. It must evolve painfully through a process of trial and error; it must overcome an inertia of both government officials and the people; and it must proceed within the boundaries of democratic processes.

The Indian Supply Organisation was created in the last week of August 1939 but its roots go much further back. In the first World War, the Indian Munitions Board was the main Supply agency. Soon after, the Contracts Directorate and the Indian Stores Department—two purchasing organisations—were created in 1918 and 1922 respectively. About 1926, the Principal Supply Officers Committee (India) was constituted as the Indian counter-part of a similar body set up in England under the aegis of the Committee of Imperial Defence. This Committee was charged with the task of investigating and making recommendations from the point of view of the Defence Services as to the most suitable war supply organisation in the country. The crisis of September 1938 which produced the so-called Munich "settlement" led to a quickening of war preparations in every country. War appeared imminent. The latest report about the creation of a war supply organisation was put forward by the Dow Committee—an *ad hoc* Committee of PSOC(I)—in July 1939 and it was on that basis that the War Supply Board and the Supply Department were created on the 26th August 1939. It was felt that the demands would be enormous and it would be necessary to plan production and create capacity. This was the idea behind the creation of the Department.

By March 1940, the Government envisaged the end of the sitzkrieg and the approach of the holocaust. It realised industry would have to be more rapidly mobilised and contracts placed with greater speed—responsibilities too great to

be handled by the then Organisation. So on April 1st, the Department was re-organised into a Secretariat and six Executive Branches. It also took over the then existing Purchasing agencies—Contracts Directorate and the Indian Stores Department—and began to co-ordinate their activities. The signs of the coming debacle in France were increasing. These signs and portents placed increasing burdens on the shoulders of the newly organised Department which was called upon, not merely to handle a sharp increase in orders, but also a rapid expansion of its personnel and of the spheres in which it operated. Decentralisation became essential. Two Directorates General were accordingly constituted as self-contained units which may be roughly described as the “hardware” and “soft goods” Branches of the Department. One was the Directorate General of Munitions Production situated in Calcutta, the main centre of the engineering industry in India, and the other the Directorate General of Supply, stationed at Delhi.

In furtherance of the object of establishing and maintaining closer contact with the Provincial Governments, the Chambers of Commerce and Industries generally, Controllers of Supplies were set up at Bombay, Calcutta, Madras, Karachi, Cawnpore and Lahore. In order to expedite action on matters requiring the Government of India's sanction and co-ordinating action in cases where a reference was necessary to the central authorities, a Branch Secretariat was attached to each Directorate General and the Director-General both of Munitions Production and of Supply were gazetted as *ex-officio* Additional Secretary to the Government of India. The concurrence of the Finance Department in all important items of expenditure was obligatory under the established procedure. From the beginning, therefore, Financial Advisers were attached to the Supply Department at every level of the organisation and they remained in close contact with the Planning and Purchase Branches at every stage of any important scheme or contract.

As capacity had to be created, the Department had to equip itself with an industrial planning organisation whose duty it was to search out and create new sources of supply and develop and expand the existing sources. It was realised early that the secret of success was close understanding with industry. Advisers selected from major industries were appointed for various industries such as Jute, Rope, Petroleum Products, Engineering, etc.

After the collapse of France, it became imperative to mobilise India's munition making capacity and it was for this purpose that the Ministry of Supply Mission known as the Roger Mission, came to India. The problem of supplying the necessities of production—certain types of machine tools for example—in which India was deficient had to be studied. The Mission studied the practicability of establishing new factories and enlarging the existing ones. It was on their recommendations that several new sections, *viz.*, Machine Tool Control, Electrical Commissioner's office, Civil Armaments Production Division etc., were organised in D.G.M.P. from 1941 onwards.

An Eastern Group Conference was held in October 1940 with the object of making the E.G. countries as far as possible self-supporting for war supply purposes. With the evolution of a joint policy as a result of the Conference, it was hoped these countries would work together as a single block for the production of war materials. The deliberations of this Conference resulted in the establishment of an Eastern Group Supply Council—a sort of co-ordinating authority—which began to place large orders on India for the Eastern Group. The fulfilment of these orders impelled a fresh drive and several new Ordnance Factories Expansion Projects such as, E.G. Projects were set in train. On the general stores side, several expansion measures were taken and this involved the setting up of several new Directorates on both sides.

Owing to the sudden change of strategy in the Pacific and entry of Japan into war, it was clear that in these conditions the increased work connected with ship repairs must be so organised as to admit of (a) rapid administrative and financial decisions and (b) complete co-ordination with "New Construction", a subject dealt with by the D.G.M.P. Ship repairs were controlled by the Director of Ship Repairs on behalf of the Admiralty and Ministry of War Transport. A new Directorate General of Ship-building and Repairs was accordingly created in 1942 with its headquarters at Bombay.

With the growing importance of India as a base for operations against Japan and with the increasing part of the Air Forces in these operations, it became necessary to re-organise the Aeronautical Stores Division of the D.G.M.P. as a separate Directorate General to deal with the enlarged target of repair and maintenance of service aircraft. A Directorate-General of Aircraft was accordingly formed in October 1943 and began to provide and create capacity for repair facilities and for the manufacture of items not hitherto made in India. Another important development was the establishment of a new Directorate General of Disposals in November 1943 with its headquarters at Delhi and regional representatives at Calcutta and Bombay, Cawnpore and Karachi to ensure the effective and expeditious utilisation and disposal of all salvage and all surplus or obsolete stores arriving in army units and installations in India or received from overseas operational areas which were not required by the Defence Services.

About the end of 1943, it was felt that the lack of co-ordination in guiding steel production and imports, in rationalising fabrication and in regulating demands and consumption was proving a retarding factor in achieving the maximum production of iron and steel and successful administration of the Iron and Steel Control Order. A Steel Commissioner was, therefore, appointed to deal with the question of statistics, the unification of control and the co-ordination of the work of the fabricators.

Coal supplies did not present any serious problems during the first three years of the war. Production was maintained at an adequate level to meet the country's demands. A serious shortage of coal, however, began to develop towards the end of 1943 and energetic steps had to be taken to maintain and increase production to meet these demands. The responsibility for the production and distribution of coal, which was previously shared by Labour, Railway and War Transport Departments was transferred to the Supply Department in June 1944 and a new Coal Commissioner's organisation with a Branch Secretariat (Coal) attached to it was set up at Calcutta.

Here, it may be pointed out that the Government machinery of war production, viz., Supply Department could be neither logical nor symmetrical, for the simple reason that it was never conceived in a single piece. The economic policies it pursued were sometimes drastic to the point of being revolutionary, but its administrative structure had grown piecemeal with as far as possible minimum disturbance to pre-existing organisations and to the established methods. It is profitless to speculate on what might have been done had the organisation been different; the material fact is that the organisation brought forth a harvest of shells, guns and other war stores such as few had ever thought possible before the war came upon us. As a result of the efforts of the Department, in four years the country underwent an industrial transformation which, under normal circumstances, could not have taken place in twenty five years.

The growth within 4-5 years of an organisation such as the Department of Supply from naught to a staff of 17,000 on V-J Day was not unaccompanied by stresses and strains—both mental and physical. Not the least difficult of the problems was that of obtaining personnel competent to meet problems far

greater than those encountered in private endeavour and of welding them into a smooth-working, co-ordinated unit. In private business long years of endeavour go into creating a properly trained and functioning organisation. However, under the drive of war, and by that co-operation and goodwill that manifests itself in national emergencies, the Department created an organisation which judged by its achievements might well be the envy of big private undertakings.

The succeeding pages show in some detail how the organisation which started with about 20 men in September 1939 grew to phenomenal dimensions till it had a staff of 17,000 on V-J Day.

CHAPTER I

WAR SUPPLY ORGANISATION DURING THE FIRST WORLD WAR

Some account of the events preceding any period is necessary to an adequate understanding of the events occurring in it. It is, therefore, essential to refer to the supply organisation functioning during the first World War. The war broke out in 1914 but up to 1916, the business of Supply was carried out through the media of several departments of Government. There was no single organisation for war supplies. The pressure of events and demands of war, however, soon brought home the necessity of a Central Supply Organisation. This organisation was the Indian Munitions Board.

Before touching on the organisation of the Board, it may be remarked that the needs of the war strained the Indian industries, and the Government of India were forced to change their attitude towards them. The unprecedented needs of the war led the Government of India in 1915 to a general survey of the position and they became convinced of the necessity of a definite industrial policy for India as a whole. An Indian Industrial Commission was, therefore, appointed in 1916. The Commission suggested that in future, Government should play an active part in the industrial development of the country, and that Government could not undertake this work unless provided with adequate administrative equipment and fore-armed with reliable scientific and technical advice. One further important recommendation was the creation of an organisation for the purchase and inspection of Government stores in India.

While the Industrial Commission was still conducting its investigations, a Government organisation of a new type brought the State into close relation with organised industry and had an important influence in stimulating industrial development. In December 1916, an enquiry was initiated by His Excellency the Commander-in-Chief, as to whether more could not be done to develop Indian resources for war purposes so as to relieve the United Kingdom as far as possible from the necessity of meeting extraneous demands. With this object and with a view to prevent competition and overlapping in the purchase of supplies, His Excellency suggested the creation of an organisation on somewhat similar lines to those of the Ministry of Munitions in the U.K. Early in February 1917, the Secretary of State also suggested that further efforts should be made to develop the Indian resources for the supply of the forces in India, Mesopotamia and Egypt. The Indian Munitions Board was established as a Department of the Government of India under the immediate charge of His Excellency the Army Member on April 1st, 1917. The Board consisted of the President, Sir Thomas Holland, who was at that time President of the Industrial Commission, and three Members. The Board's primary function was the utilisation to the utmost extent of Indian resources in materials of all kinds required for the prosecution of the war, an object which included, not merely the actual use, wherever possible, of Indian materials and manufactures, but also the purchase of these and of imported stores on the most advantageous terms by a purchasing organisation which should eliminate competition in buying between the different departments of the public service. The functions of the Indian Munitions Board were three-fold:—

- (a) to restrict demands on the United Kingdom and later, on the United States of America, for articles which would cause interference with war work in those countries and which could be dispensed with or obtained in India or from elsewhere;
- (b) the supply of large quantities of plant and materials to Mesopotamia, East Africa, Egypt and other theatres of war, as well as to the Army and Civil Departments in India; and
- (c) the development of local industries.

Despite the difficulty of developing industries under war conditions and of securing the necessary staff, the Board got to work with astounding promptitude. It eventually took over the organisation in its entirety of all Government Ordnance, clothing, hide and leather factories and created subsidiary ones; it worked up the production of woollen and worsted goods in the existing mills to meet Army requirements; it assumed responsibility for the shipment of raw and tanned hides for army purposes; it provided vast quantities of railway track, rolling stock and plant to overseas theatres; it established a Government tent factory and furnished materials to new factories started by private agency; it centralised the purchases of jute goods, thereby effecting enormous savings; it constituted a Rivercraft Branch to take over the work of constructing or re-erecting vessels for water transport and a Timber Branch to collect for shipment nearly a quarter of a million tons of various kinds of timber for structural work, in addition to lighter wood suitable for other forms of construction and repairs, and to conduct an exhaustive search for timber suitable for aircraft; it controlled the products of the Tata Iron and Steel Works at Jamshedpur in steel and pig-iron; it also controlled the entire manufacture of cement in India, of ship repairs, and of certain engineering materials, and provided enormous quantities of miscellaneous plant and stores including machinery of all kinds and various equipment for the docks and workshops in Mesopotamia and East Africa.

In addition to the above, use was made of the Board's organisation in furthering war interests by the scrutiny of priority applications for assistance in obtaining goods from the United Kingdom and the United States of America and Government indents on the India Office, and by curtailing export of certain materials. From this terse catalogue some conception may be gained of the immense variety of the Board's activities and of the complex organisation required to control them. At the time of Armistice it was controlling expenditure upon war material amounting to two millions sterling a month.

The Board caused as little dislocation among the existing agencies as possible. It took over the existing supplying agencies which could readily be detached and could more appropriately be placed under its direction. No effort, however, was made to make changes for the sake of completeness. The Board did not absorb units which were already organised for war purposes in a self-contained manner. For instance, the arrangements made by the Commerce and Industries Department for the supply of mica, wolfram and lac were not disturbed. The Board had a rapid expansion and in its final organisation its machinery was analogous to that of the Railway Board, constituting with the Army Member a Department of the Government of India. It consisted of a President, assisted and advised by four Members. Unlike the Railway Board, however, the Indian Munitions Board had a Financial Member who was also Financial Adviser to the Army Department.

The Board had an organisation at the headquarters of the Government of India supplemented by Provincial Organisations in each province. The headquarters staff was divided into well-defined branches, each relating to a subject which, for technical or commercial reasons, required centralised control. Six of these branches were, however, stationed at Calcutta, namely, Hides, Jute Manufactures, Shipbuilding, Electrical and Mechanical, Hardware and Miscellaneous, and one, Agricultural Requirements of Mesopotamia, at Poona. Each Branch was placed under a Controller. The Controllers were assisted as a rule by Deputy and Assistant Controllers, some of whom were stationed at important centres elsewhere in India. Each Member of the Board was directly responsible for a group of Controllers. Eventually in addition to the branches which were specially concerned with establishment and general administrative work, there were twenty branches, each under a Controller, *viz.*, Industrial Intelligence, Chemical and Mineral, Priority, Home Indents, Indent Distribution, Railway Materials, Shipbuilding, Timber Supplies, Hides, Textile,

Clothing, Jute Manufactures, Agricultural Requirements, Mesopotamia, Ordnance Factories, Electrical and Mechanical, Hardware and Metals, Oils and Paints, Miscellaneous Stores, Munitions Production and Finance.

The Provincial Organisations included ten Controllers in Bombay, Bengal and Assam, Madras, Burma, Punjab, United Provinces Central Provinces and Berar, Bihar and Orissa, Delhi and Karachi areas. These were Liaison Officers of the Board with the Provincial Governments. They also saw that all local industries were fully utilised for war work and collected information for the Board. The system of local representatives was later extended to the Indian States and Controllers of Munitions were appointed in Baroda, Mysore, Travancore, Benares, Kashmir, Pudukkottai, Banganapalle, Sandur, Hyderabad and Rampur. The Board also utilized the Defence of India Rules for the purpose of securing munitions of war and facilitating the development of the resources of India.

The Board was able to foster the growth of indigenous industries in many ways, the most important of which were:—

- (a) the direct purchase in India of articles and materials of all kinds needed for the army, civil departments and the railways;
- (b) the diversion, whenever practicable, by means of the priority system and its control over home indents, of all orders for articles and material from the U.K. and elsewhere to manufacturers in India;
- (c) the giving of assistance to individuals and firms who desired to import plant or to engage chemical and technical experts and skilled labour from England or elsewhere in order to establish new industries or develop old ones; and
- (d) the dissemination of information and expert advice and the giving of other direct or indirect encouragement to persons prepared to establish new industries in India.

With the exception of foodstuffs, medical stores and certain technical stores, such as mechanical transport for the provision of which there already existed special organisations, the Indian Munitions Board became responsible for the supply of all articles required by the armies stationed in and based on India, by Government departments and by State railways, as well as for certain materials needed by H.M.G.

The Board also acted as a Bureau of Industrial Information for manufacturers and others contemplating innovation in production. Expert assistance was available. Exigencies of the war led to a substantial expansion in direct manufacture by Government. The Ordnance Factories were greatly expanded under the Board's control. Army Clothing and leather goods were manufactured on a large scale. The work of the Indian Munitions Board naturally coloured the views of the Industrial Commission and influenced their recommendations. They described it as a "practical anticipation of many of the conclusions which had been forced upon us by evidence" and remarked that it "became in effect, an experiment on a large scale designed to test the value of many of our conclusions regarding not only the manufacturing capabilities of the country but also regarding the kind of administrative machinery most suitable to carry out our proposals".

CHAPTER II

SUPPLY ORGANISATION AFTER THE FIRST WORLD WAR.

(a) **Stores Purchase Committee.**—The main work of the Indian Munitions Board ended with the Armistice and as recommended by the Industrial Commission, the next step was to convert it into an organisation capable of undertaking the duties assigned by the Commission to the Central Department of Industries. It was not possible prior to the amendment of the Government of India Act to add another Member to the Viceroy's Council but the Government of India proposed as an interim measure, that the Board which was now to be designated as the Board of Industries and Munitions, should be modified in structure and placed through its President directly under the Viceroy. This proposal was approved by the Secretary of State in September 1919 when he accepted the fundamental principles underlying the Commission's recommendations and agreed to a policy involving the acceptance of active participation by Government in industrial development as one of the legitimate functions of the State. He added that in giving effect to the policy advocated by the Commission "State assistance will take various forms such as research, the survey of natural resources, technical and scientific advice, educational facilities, commercial and industrial intelligence, the establishment of pioneering and demonstration factories, financial help, the purchase of Government stores in India; whether in the usual way of business or under a guarantee of purchase over a fixed period, and probably also fiscal measures". The Stores Purchasing Committee was appointed at the end of 1919 in accordance with the Commission's recommendations. Its main purpose was to work out a scheme for the establishment of the agency for the purchase of stores recommended by the Commission. The Committee was to report "what measures are required to enable the Departments of the Government of India and of Local Governments to obtain their requirements so far as possible in India, and what central and local agencies for purchase and inspection should be constituted". The Committee had its President Mr. (afterwards Sir) Francis Couchman, a Member of the Railway Board. It recommended the establishment of an Expert Purchasing Agency, equipped with facilities for knowing the manufacturing resources throughout the country, able to purchase efficiently and competent to carry out such inspections as might be necessary.

(b) **Indian Stores Department.**—The Expert Purchasing Agency mentioned above was the Indian Stores Department which was constituted in January 1922. This Department aimed at the encouragement of the industries of the country without sacrificing economy.

Originally the Indian Stores Department was to buy chemical stores, oils, paints, leather, textile goods, timber and engineering stores etc. The Department was able to absorb the existing organization (D. G. I. S. D.) for the purchase of stores in London and to utilise it as a branch working under the High Commissioner for securing all such stores as could not be purchased in India. The Stores Rules which laid down the policy to be followed by all agencies for the purchase of stores were modified by a Committee appointed by the Indian Legislature to consider the steps to be taken to encourage the establishment of industries in India. The new rules came into force in 1924. The preamble of the rules contained the following statement. "The policy of the Government of India is to make their purchases of stores for the public service in such a way as to encourage the industries of the country so far as is consistent with economy and efficiency". When the Department was established in January 1922, the Provincial Governments were advised to utilise its services besides such public bodies as company-managed railways, ports trusts, municipalities, which might so desire. At first, in September 1921, a Director of Purchase and Intelligence was appointed. The Department was constituted on the 1st January 1922 when the Chief Controller of Stores

was appointed. From small beginnings, it gradually expanded. The Textile Purchase Section which was started under the Munitions Board and had been shifted under the Department of Industries formed the nucleus of the purchase side of the Department. The Department also absorbed the Superintendent of the Local Manufacture at Calcutta, Metallurgical Inspector at Jamshedpur, and the Government Test House at Alipore. Besides having a Purchase and Inspection Agency and acting in an advisory capacity in all matters connected with purchase of stores for its indentors, the Department also scrutinised the Home Indents placed by all Central Government departments, Minor Local Governments and other authorities. The Department was re-organised from time to time. Inspection Circles in various provinces were created. The Department also inspected stores purchased by Railways and other authorities direct. Later it began to cater for other stores for the Army. Gradually in addition to Inspection Circles, Purchase Circles were created in the provinces and the department became the chief agent of the Central Government for the purchase and inspection of stores obtainable in India under the provisions of the Store Purchase Rules. In 1939, before the outbreak of war, the Department had a big organisation having the following three branches; (a) Purchase; (b) Administration and Intelligence; and (c) Inspection.

Purchase was under a Director of Purchase and had three sections (1) Textiles and Leather, (2) Engineering and Electrical; and (3) Hardware and Miscellaneous. There were Purchase organisations in Calcutta, Bombay and Karachi. The Administration and Intelligence Branch was under a Director of Inspection. There were several Inspection Circles, e.g. Karachi, Calcutta, Bombay, Madras etc., besides the Controllers, Metallurgical Inspectors and Industrial Research Bureau and Government Test House, Alipore.

Besides, the Indian Stores Department had a Branch in London the office of the DG, ISD, which was attached to the office of the High Commissioner for India. This office had a Director of Purchase with Controllers in charge of various branches. On the Inspection side, there was a Director of Inspection who had highly qualified technical officers under him. The Administration side received indents from India, placed orders, etc. In short, this organisation arranged for the procurement of goods, inspection and shipments. In 1939, the I.S.D., London, dealt with orders to the value of some pound 2 million sterling.

With the outbreak of the war, the Department with its well established organisations and wide knowledge of the Indian market was able to bear successfully the brunt of the initial war efforts in India in respect of the supply of materials of varied character. It arranged for the supply of all kinds of stores except Foodstuffs and forage, lethal stores, stationery and medical stores, mathematical and scientific instruments, straw, firewood, charcoal and road materials etc., etc. During 1938-39 the total purchases made by the Department amounted to Rs. 5.57 crores only.

(c) **Contracts Directorate.**—It was on the 1st May 1918 that contract control for central purchase of foodstuffs, forage, firewood and miscellaneous stores was created under the control of the Director of Contracts. This organisation gradually expanded taking over the purchase of various items from the Indian Munitions Board on its abolition. The necessity for contract control was accepted by the Braithwaite Committee in 1923, their recommendations being endorsed by the Inchcape Committee. In 1926, the Disposals Organisation was formed and continued as part of the contracts Directorate. In the same year the grain depots which had been established as an experiment at Lahore, Peshawar and Lucknow for the central handling and crushing of grains were organised on a permanent basis. The Ghee Heating Centre at Agra also under the control of the Director of Contracts commenced the central collecting, refining and issuing of ghee at the end of the same year. With the

modernisation of the Defence Services, demands for a greater variety and better quality of stores arose, necessitating a larger general stores purchasing organisation. The Directorate continued to make efforts to make India more and more self-supporting in Defence Services requirements. The encouragement of indigenous manufacture of as many items as possible was one of the chief aims of the Contracts Directorate. The organisation when the war broke out stood as follows. The Contracts Directorate was under His Excellency the Commander-in-Chief. All administration and organisation was under the Master General of Ordnance except administration and organisation of Grain Depots, controlled flour mills and ghee heating centres which were under the Quartermaster General in India. The Director of Contracts attended to administration and organisation of the contracts Directorate, Grain Depot, Controlled Flour Mills and Ghee Heating Centres. The Directorate also attended to the following:—

- (a) purchase of certain stores required by the Defence Services in India;
- (b) control of five organisations under Government or agency management;
- (c) disposal of surplus, obsolete and waste Defence Services stores by transfer to Government departments, by auction or private treaty sale; and
- (d) arrangements for purchasing in war those stores which were allotted to the Directorate.

In general the Contracts Directorate was responsible for the purchase of food-stuffs, forage, petroleum, oils and lubricants, general stores, timber etc. The indentors were Director of Ordnance Services, Director of Ordnance Factories, Director of Supplies and Transport, Director of Remounts, Director of Farms, Director of Veterinary Services, Director of Medical Services, Flag Officer Commanding, Royal Indian Navy, Air Officer Commanding, Air Force-in-India, Military Engineering Services and miscellaneous. The Directorate had three sections:—(1) Purchase; (2) Disposals and (3) Administration and organisation. An idea of the organisation can be formed from the fact that during 1938-39, it made purchases amounting to Rs. 26,481,624 for the Defence Services, a part was obtained direct from the UK, i.e., from the Director General, Indian Stores Department, London, and a part through the Chief Controller of Indian Stores Department.

(d) **Principal Supply Officers' Committee.**—Soon after the first World War, the Army Headquarters inaugurated the problem of creating a supply organisation which would be capable of expansion from peace to war conditions and the Principal Supply Officers' Committee (India) was constituted in 1926 as the Indian counter-part of a similar body in England under the aegis of the Committee of the Imperial Defence. This body was charged with the task of investigating and making recommendations from the point of view of the Defence Services as to the most suitable war supply organisation for the country. Its enquiries covered a wide field and most of them were of a highly confidential nature and no publicity was given.

The Committee was controlled by the Defence Department. Prior to 1934, the Deputy Secretary, Defence Department used to deal with it personally. In 1934, it was decided to have a separate organisation and a separate Secretary was appointed. The Commerce Member was the President of this Committee; Master General of Ordnance, Quartermaster General in India, Controller General of Inspection, Chief of the General Staff, Director General, Indian Medical Service; Secretary, Labour Department and Secretary, Commerce Department being its members; there were about eleven members. There were sub-committees called Panels under them. They dealt with different subjects such as chemical stores, engineering stores etc.

The chief functions of the Committee were to investigate war-time requirements and the resources available to meet them. The main point was how far the country could be made self-sufficient in war. The military officers were working on a plan called the Pink Plan. The requirements were for the Defence Services, Railways, Posts and Telegraphs Department, Public Utilities and essential industries and essential supplies for the civil population.

During 1938, a beginning was made on the collecting of requirements of the iron and steel industries, oil refining, textile manufacture, Government Ordnance Factories, Railways, Posts and Telegraphs, Mathematical Instrument Office etc. While these industries could obtain most of their basic raw materials indigenously, it was feared they would come to a standstill, were imports of any vital accessories totally cut off for any length of time.

The Sub-committees dealt with planning, contracts, co-ordination, engineering stores, transport, scientific stores, chemicals, medical and veterinary stores, petroleum products, armaments, foodstuffs and general stores.

From the beginning to the outbreak of war, a large number of military and civil officers put in many hours of hard work and study. Many tons of paper were consumed and what at that time were thought valuable and effective reports were produced. However, the placing of demands did not eventuate as the Committee had visualised. Once it was proposed that the concluding act in drafting a report would be to type a telegram placing demands on the industry so that the whole of the industrial machine should be set in motion on Zero Day. In the event, developments occurred otherwise.

However, on the basis of these series of reports an *ad hoc* committee made recommendations for the creation of a supply organisation which was presented to the Government a few weeks before the war broke out. Pioneering work was done by the Committee and it is always hard. The men who comprised the committee continued with zeal and carried its work through to a point at which it provided a most valuable advice to the Government when the hour of crisis came.

In 1939 a separate department called the Defence Co-ordination Department was formed and this Committee was made an attached office to the Department. On the outbreak of war, it was separated from the Defence Co-ordination Department and formed the nucleus of the War Supply Board and the Supply Department.

CHAPTER III

THE HOUR OF CRISIS (1-9-1939)—CREATION OF THE WAR SUPPLY BOARD AND THE SUPPLY DEPARTMENT.

- The crisis of September 1938 which resulted in Munich "settlement" led to a quickening of war preparations in every country. It was felt that war was coming. Re-armament was very much in the air. Though the Government of India did not advertise its intentions, by July 1939, it had formulated plans for the creation of the Supply Department which came into being the following September. On the Supply side, two independent organisations, Indian Stores Department and the Contracts Directorate were already functioning. These organisations, however, were meant for catering to an army maintained during peace-time.

A few days before the war broke out, the historic days of tension, it was considered necessary to create the Department of Supply and it was on 26th August 1939 that the Government of India announced its creation, to deal directly with questions concerning supplies of all kinds required for the prosecution of the war. The Department was added to the portfolio of the Hon'ble Sir Muhammad Zafrullah Khan, K. C. S. I., Law Member of the Governor General's Executive Council who had been for some years President of the Principal Supply Officers' Committee (India) and was directly administered by the Hon'ble Mr. H. Dow, C. S. I., C. I. E., I. C. S., who was appointed the first Director General. Though the Department was organised in the first week of September, it would be a misapprehension to think that a complete Supply Organisation sprang into being at once with the declaration of war. The roots of the Organisation go much further than that and the nucleus may be said to lie in the PSOC(I).

In peace-time, generally speaking, a purchasing organisation is operating on a market which has spare capacity or at least potential spare capacity waiting to be developed. But what is also of very great importance, there are alternative sources of supplies from other countries and large stocks are held by importing houses. In war the situation is entirely changed. Owing to shipping difficulties, a country has to live more and more on its own resources and these have to be developed to the utmost. The normal peace-time purchasing organisation cannot be fully equipped for this purpose and this is one of the main reasons why the Supply Department was formed with its industrial planning organisation to search out and create new sources of supply and develop the existing sources to their utmost.

The Government of India also set up a War Supply Board to ensure that supplies of all kinds of war stores were available with the utmost speed and to co-ordinate the activities of all Departments of the Government of India and the commercial firms or organisations to that end. The Director General of Supply and the Deputy Director General of Supply were appointed President and Vice-President respectively, with a representative each from the Railway Board, M. G. O., Q. M. G., Finance Department, C. C., I. S. D., and the Director of Contracts as members. In all there were eight members. This was the original constitution. The Board was reconstituted in November 1939 with the Director General of Supply as President and a representative of H. E. the Defence Member, Financial Adviser (Military Finance), Chief Commissioner of Railways and the Secretary, Commerce Department, as members. Its decisions thus became those of the Government of India which resulted in a great speeding-up of business.

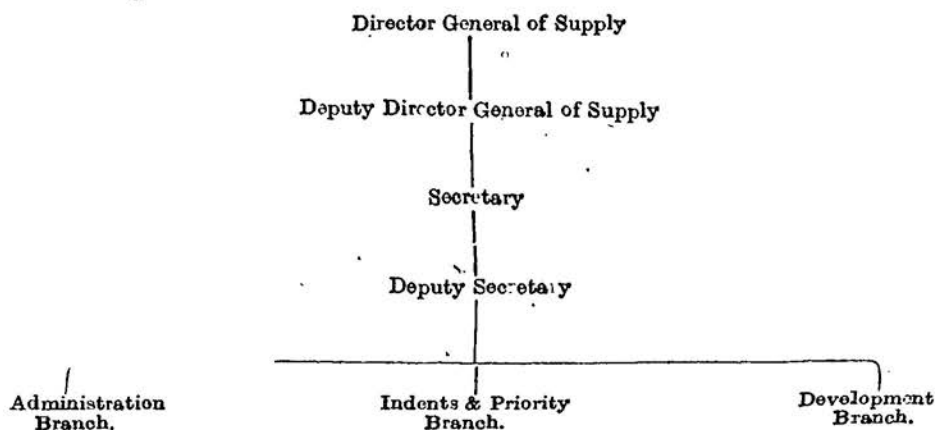
The concern of the Department of Supply and of the Board was the procurement of supplies essential for the prosecution of war. All purchases were normally to be on account of the Government of India, but purchases were also frequently made on behalf of H. M. G., the Governments of the units of the British Empire, the Allies, Provinces and the Indian States.

CHAPTER IV

EARLY ORGANISATION OF THE SUPPLY DEPARTMENT (SEPTEMBER 1939 TO JANUARY 1940)

The Department was provisionally organised into branches and sections on the 16th September 1939. The Director General of Supply was at the head and under him was a Deputy Director General. Then there were Secretary and Deputy Secretary also under the Director General. There were only three branches—Administration, Indents and Priority and Development—each under a Director. The Administration Branch dealt with budget, finance, co-ordination, provincial organisations, establishment matters; Indents and Priority Branch with indents, progress and deliveries, contracts, stocks, licences, assistance, priority, etc.; and the Development Branch dealt with development of industries, statistics of manufacture, liaison for man-power, planning for materials, substitutes, etc.

At this time the total strength of the Supply Department was hardly thirty to forty men. A chart showing the constitution of the Department in September 1939 is given below:—



Soon after a fourth Branch—Control Branch—had to be set up. Controls had to start soon after the outbreak of war. Liaison and Control Officers were appointed for various commodities such as steel supplies, steel fabrication, chemicals, dyes, wool, leather manufactures along with dyeing, petroleum products, etc. From the 29th November 1939, a single officer was appointed in charge of those activities of the Supply Department which could be defined as "the control of all-India schemes in being". These schemes were taken to mean—

- (a) the woollen industry which was taken to cover the control and purchase of wool in India, matters concerning the woollen mills including supplies of wool to mills and export restrictions on wool;
- (b) the jute purchase arrangements including price questions;
- (c) the control arrangements including price questions; and
- (d) the control arrangements for hides and skins both raw and tanned.

From time to time, further matters were to be brought under his control as and when it was found necessary to organise a trade or industry or to regulate a particular export as in the case of wool. This officer was also handling all matters pertaining to such schemes.

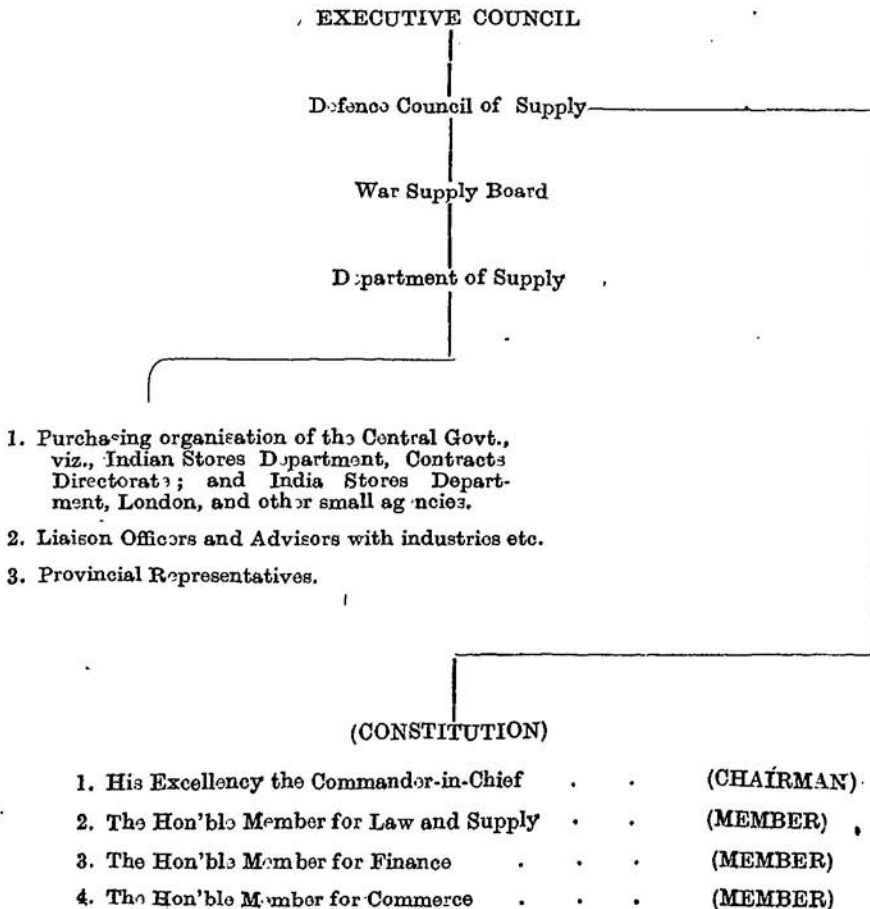
The "Control Branch" took charge of all dealings in articles and commodities concerning an industry or trade when it had been mobilised or otherwise planned in order to secure a given or the maximum output. This marked a new chapter in the History of the Department. Hitherto, the three existing Branches transacted business on the basis of the aspect of any case for which

they were responsible and on this basis several officers were concerned with a single transaction. This arrangement was not satisfactory. The new arrangement was to make one officer responsible for the industry or trade when it had been mobilised and planned. In other words, the future expansion of the Department was to be by the successive introduction of new branches and the officers of such new branches were to be responsible for definite articles and commodities. The Control Branch was responsible for Wool, Cotton, Jute, Hides and skins, Leather and leather products including boots and grindery, Steel supplies, Mica and Barbed wire and all other wire products.

Early in March 1940, a new Branch designated as the Engineering Branch was set up under a Director and made responsible for steel and iron supplies, engineering, non-ferrous metals and mica.

With effect from the 13th December 1939, the administrative and executive control of the Contracts Directorate was transferred to the Department of Supply as a temporary measure for the duration of war. The responsibility for the subjects dealt with by the Directorate was transferred from the portfolio of Hon'ble the Defence Member to the portfolio of Hon'ble the Supply Member.

The organisation of the Government of India for the procurement of essential supplies for the prosecution of war as it stood in January 1940 is given below:—



The constitution of the War Supply Board admitted of decisions being taken on behalf of Government and its object was to provide a more expeditious alternative for the normal inter-departmental methods of consultation and of reaching decisions. The Board also made proposals to the Defence Council of Supply—a Sub-Committee of the Governor General's Executive Council.

The Supply Department began to make use of the existing procedure, systems and agencies and of the existing peace-time supply organisations of Government. It was the intention to carry out all war purchase work through these organisations expanded to the extent necessary until they showed signs of breaking under the strain; and it was a tribute to the soundness of these peace-time organisations that none of them showed any signs of such a breakdown—on the contrary, they showed every sign of being equal to the strain.

CHAPTER V

FURTHER RE-ORGANISATION (SECRETARIAT, EXECUTIVE OFFICES, PROVINCIAL ORGANISATIONS, TRANSFER OF ORDNANCE FACTORIES) APRIL TO JULY, 1940

It has already been shown how the Control Branch started functioning. Later it became necessary to organise other branches for various other industries, such as Textiles, Timber, Engineering and Chemicals Branches. The Department gradually expanded and it became necessary to re-organise it.

(a) **Secretariat and Executive Offices.**—It was, therefore, organised into (a) Secretariat, and (b) six executive offices styled as Directorates from 1st April 1940. The Secretariat was placed under the Secretary, who had Deputy, Under and Assistant Secretaries to assist him. The Executive Offices were six Directorates, viz., (1) Textiles; (2) Engineering; (3) Chemicals; (4) Statistical; (5) Indents; and (6) Timber each under a Director.

Matters of principle or policy and matters requiring the sanction of Government or the issue of Government orders were to be referred to the Secretariat by Directorates. The responsibilities of the Secretariat included the formal issue of financial orders and sanctions and the exercise of the powers residing in the Defence of India Ordinance and its rules together with the responsibility for all other statutory and legislative matters which concerned the Department. Export and import restrictions, budget, finance, legislative business were also dealt with by the Secretariat.

(b) **Provincial Organisations.**—It also became necessary to expand the activities of the Supply Department and the Chief Secretaries of all Provincial Governments were consulted regarding the expansion. Local Supply Organisations under Controllers of Supplies were gradually set up at six centres, viz., Delhi, Calcutta, Karachi, Madras, Cawnpore and Lahore, by July 1940.

(c) **Transfer of the Indian Stores Department to the Supply Department.**—With effect from the 12th April, 1940, the administrative and executive control of the I.S.D. was transferred to the Department of Supply as a temporary measure for the duration of the war.

(d) **Transfer of Ordnance Factories to the Supply Department (July 1940).**—The Governor-General-in-Council decided on the initiative of His Excellency the Commander-in-Chief to carry out a re-organisation and expansion of the Supply Department which had the effect of transferring the responsibility for certain important sections of Army Headquarters from the control of His Excellency the Defence Member to that of the Supply Member. Hitherto the direct responsibility for the production of armaments, ammunition, army clothing and of harness and saddlery required for the Armed Forces lay with the M.G.O., who was not only controlling eight Ordnance Factories but had been responsible for the organisation of civil production of vast quantities of other war supplies and maintaining the flow to these factories of the necessary raw materials—steel, textiles, leather etc. Consequent on this decision, the administrative control of the Ordnance and Clothing factories was transferred, as a temporary measure, for the duration of war, from the Defence Department to the Supply Department. The Ordnance factories which had hitherto been administered by the M.G.O. were to be administered by the D.G. Engineering and D.G.S. respectively. The officers and establishment employed on the administration of the Ordnance Branch were transferred *en bloc* to the respective Directorates General. The section in the Engineer-in-Chief's Branch dealing with the modernisation of factories was also transferred to the Supply Department.

It was ordered that all policy references including demands for the supply of munitions stores and instructions regarding delivery of the same should be made by and to the Government of India, Department of Supply, or Defence Department, but references relating to the detail of actual production of materials, machinery, plant etc., should be made to the Calcutta organisation. This arrangement came into force from the 12th August, 1940.

Owing to the enormous pressure of demands from all sources upon India's productive capacity, the Government decided that the time had come to place the whole of the Supply organisation of this country under unified direction and control. The general direction and control of new supply organisation was to be carried out through the War Supply Board which continued as before. But the Supply Member was now the President and the Director General of Supply the Vice-President and the Principal Civil Adviser to the Hon'ble Member, from 1st April, 1940. This organisation functioned through two main branches, one under a Director General of Engineering responsible for armaments and ammunition, steel production, metals etc., and the other under a Director General of Supply for all 'common user' or general stores.

As the Government of India was also well aware of the wide-spread desire on the part of commercial and industrial interests in India to be more closely associated in the development and direction of India's war effort, there was associated with the Director General of Engineering a panel of non-official industrialists with a view to co-ordinating potentialities and harnessing them to the war machine.

The M.G.O. formed the link between His Excellency the Commander-in-Chief and the Hon'ble Supply Member to whom he was to act as Military Adviser. In that capacity he was responsible for keeping the Supply Member informed of all military developments bearing on the subject of supply and consequent requirements. He also continued to be a Member of the War Supply Board.

(e) **Creation of a Directorate General of Munitions Production.**—The designation of the "Director General, (Engineering)" was changed to that of the Director General Munitions Production and the War Supply Board agreed to the move of the D.G.M.P. along with his staff to Calcutta. The idea was that they should be in closer touch with the industry. The staff moved to Calcutta in July and August, 1940.

(f) **Re-organisation as a result of transfer of Ordnance Factories (August, 1940).**—Transfer of the control of Ordnance Factories to the Department of Supply necessitated further changes which took effect from the 12th August, 1940. The Department of Supply from then onwards was to include:—

- (1) Secretariat;
- (2) The Directorate General of Supply;
- (3) The Directorate General of Munitions Production;
- (4) The Purchase Organisation;
- (5) The Controllers of Supplies; and
- (6) Other local organisations, viz., the Mica Inspectorate.

The Secretariat was under the Secretary, assisted by four Deputy, three Under and one Assistant Secretaries and one Director Statistics. The Directorate General of Supply was under a Director General, who had two Deputy Directors General under him—one to deal with Textile and Leather and the other with Timber and Miscellaneous. There were six Directorates, viz., Textiles;

Clothing; Leather Manufactures; Timber; Miscellaneous and Indents; Chemicals, Petrol and Oils. The D.G.S. had Harness and Saddlery Factory, Cawnpore and the Clothing Factories under his control.

The D.G.M.P. was also under a Director General, who was assisted by two Deputy Directors General—one for Civil Munitions Production and the other for Engineering. There were the following Directorates: (a) Directorate of Ordnance Factories; (b) Civil Munitions Production; (c) Metals; (d) Engineering; (e) Factory Works Section. It also controlled the Rifle Factory, Ishapore; Gun and Shell Factory, Cossipore; Metal and Steel Factory, Ishapore; Gun Carriage Factory, Jubbulpore; Ammunition Factory, Kirkee; and Cordite Factory, Aruvankadu.

Financial control of the Supply Department continued to be exercised by the Financial Adviser, Military Finance, as hitherto, while the transactions in the factories continued to be governed by the Army Regulations and orders issued from time to time and were as hitherto to be accounted for in the accounts of the Defence Services by the Controller of Army Factory Accounts.

CHAPTER VI

DE-CENTRALISATION (DIRECTORATES GENERAL OF MUNITIONS PRODUCTION AND SUPPLY AS SELF-CONTAINED UNITS)—OCTOBER TO DECEMBER, 1940

The Government of India, about October 1940, decided in principle to effect a re-organisation of the Department of Supply and its attached organisations to secure closer association of the various purchasing sections with the planning directorates. The main features of the scheme were to be:—

- (a) Standardisation of the purchasing powers of the various purchasing sections;
- (b) Separation of the Inspectorate of the Indian Stores Department from that department for the duration of war and its division into two parts dealing with (i) Engineering and (ii) Textiles and General Stores;
- (c) Maintenance of the identity of the Indian Stores Department and the Contracts Directorate;
- (d) By a re-arrangement of the personnel of the Indian Stores Department and the Contracts Directorate, to associate with each of the two Directorates General a composite but self-contained purchasing organisation;
- (e) The gazetting of the Directors General, Munitions Production and Supply, respectively as *ex-officio* Additional Secretaries to the Government of India;
- (f) The provision of a separate Indents Section or Branch in each Directorate General;
- (g) Local purchasing organisations (except at New Delhi and Calcutta) to be placed under the Controllers of Supplies who in turn would work for both Directorates General.

This organisation was ultimately brought about from the 15th December, 1940, and with these changes the Department of Supply stood as follows:—

- (i) A Secretariat which was an ordinary Department of the Government of India.
- (ii) Two Directorates General stationed at Calcutta and New Delhi, responsible respectively for munitions and engineering stores and general stores;
- (iii) The Indian Stores Department and the Contracts Directorate with headquarters at New Delhi and responsible for actual purchase of all stores.
- (iv) Controllers of Supplies, Provincial Purchase Branches and Industrial Planning Officers located in the provinces;
- (v) Representatives of the Finance Department were located with the Secretariat, the Directorates General and the headquarters of the two Purchasing Organisations;
- (vi) The General direction and control, however, was being carried out through a War Supply Board of which the President was the Supply Member (The Hon'ble Sir Mohammad Zafrulla Khan) and the Vice President, the Director-General of Supply (the Hon'ble Mr. H. Dow).

Experience showed that these arrangements resulted in excessive centralisation and some de-centralisation appeared necessary. De-centralisation is a phase in the growth of an organisation. If it is suppressed or too long deferred, the centralized control becomes clogged with detail, which forces it to work by rigid rules which can rarely be tempered for any special cases. With the two Directorates General and the two Purchasing Organisations working in

parallel under the orders of the Government of India at New Delhi and Simla, decisions on many matters frequently could not be obtained without long correspondence, which took time. Moreover, as the headquarters of both purchasing organisations were at New Delhi, it was necessary for the head of the Calcutta Purchase Branch to report many cases to New Delhi for orders. It was, therefore, decided to de-centralise responsibility as follows:—

- (1) Two Directors General, were gazetted as *ex-officio* Additional Secretaries to the Government of India. They were thus, with the concurrence of their financial advisers, in a position to issue any order which a Secretary to the Government of India could issue at headquarters with the concurrence of the Finance Department. In the exercise of these wide powers, they were guided by the practice of the Government of India and naturally issued no orders affecting matters beyond their own immediate spheres, such as those involving policy decisions or committing more than one Directorate General or other Departments of the Government of India without reference to headquarters.
- (2) The two purchasing organisations were already arranged in specialised sections, dealing with the purchase of particular commodities. The responsibility for purchase was divided between Calcutta and New Delhi on clearly defined lines. The D.G.M.P. was responsible for the production, manufacture and purchase of all munitions and engineering stores or "hard stores". The Calcutta Purchase Branch dealt with these stores only. The D.G.S. was, broadly speaking, responsible for the production, manufacture and purchase of all general or "soft" stores. The New Delhi Purchase Branch dealt with these stores. The personnel of the two purchasing organisations were so distributed that the sections dealing with Calcutta items were at Calcutta while the sections dealing with New Delhi items remained at New Delhi. The Chief Controller, Indian Stores Department, was head of the purchase staff at New Delhi, and the Director of Contracts the head of the purchase staff at Calcutta. The specialised purchase sections worked in the closest contact with various Directorates concerned. With the new arrangement, C.C., I.S.D., became the head of the purchase staff at New Delhi dealing with purchase of items for the D.G.S., whether that staff belonged to the I.S.D. or the Contracts Directorates. The Director of Contracts similarly became the head of the purchasing staff at Calcutta dealing with purchase of items for the D.G.M.P. They were designated as Chief Controllers of Purchase (Supply) and (Munitions) respectively. The result was that the two Directorates General became self-contained, the Directors General being competent, with the concurrence of their financial advisers, to take decisions without financial limit on all matters referred to them. The Indian Stores Department and the Contracts Directorate were not abolished but preserved their identity, the Chief Controller Indian Stores Department and the Director of Contracts remaining responsible for all cases relating to the personnel of their two departments.
- (3) To secure uniformity in inspection, previously partly a military and partly a civil function, the I.S.D. Inspectorate was separated from that department and divided into two parts, Engineering and Textiles and General Stores Inspectorates.
- (4) Controllers of Supplies, except at Calcutta, were placed in charge of the departmental staffs working in their respective areas and were the representatives of the Government of India in the Department of Supply.

CHAPTER VII

CREATION OF A PURCHASE BRANCH OF THE SUPPLY DEPARTMENT—FURTHER RE-ORGANISATION (AUGUST 1941)

It has already been mentioned that the administrative and executive control of the Indian Stores Department and the Contracts Directorate was transferred to the Department of Supply as a temporary measure for the duration of war along with the responsibility for the subjects dealt with by them in December 1939, and April 1940, respectively. When the Department of Supply was re-organised in December 1940, the treatment of the I.S.D. and the Contracts Directorate was briefly as follows:—

- (i) The personnel of the I.S.D. and the Contracts Directorate were re-arranged so as to associate with each of the two Directors General a separate but self-contained purchase organisation.
- (ii) The identity of the I.S.D. and the Contracts Directorate was preserved:—
 - (a) by a direction that the persons belonging to these two organisations were to be employed in separate recognisable working units; and
 - (b) by a provision that the C.C., I.S.D., and the Director of Contracts were to remain heads of their own departments and were as such, to deal independently with the creation of new posts, recruitment, promotion, discipline and establishment matters generally;
- (iii) The Inspectorate of the I.S.D. was transferred bodily, for all technical purposes to the Military Inspectorate.

Re-organisation—July 1941.—About July 1941, the Government of India felt that the preservation of the identity of the I.S.D. and the Contracts Directorate was not essential to the re-organisation scheme of December 1940, the main object of which was to delegate to the two Directors General within their respective fields powers of the Governor-General-in-Council and to provide them with staffs through which (subject to financial concurrence in appropriate cases), these powers could be exercised. In fact, it was felt that the preservation of the identity of the two organisations had led to certain difficulties which were likely to increase rather than diminish as time went on. In short these difficulties were:—

- (1) two separate streams of recruitment to temporary war posts, the duties of which were indistinguishable, were not easy to justify.
- (2) the main function of the C.C.P.(S) and C.C.P.(M) were the day-to-day working of the purchase machine, but too much of their time was inevitably taken up by their routine administrative duties as heads of departments; and
- (3) within the composite organisations then existing, the gradual standardisation of procedure was difficult.

It was, therefore, decided to create for the duration of war, a single Purchase Branch of the Supply Department to include—

- (a) permanent posts in the I.S.D.;
- (b) all posts in the Contracts Directorate existing on the date of change; and
- (c) temporary war posts (including temporary war posts already existing in the I.S.D. on the date of the change).

The new Branch was organised to staff

- (i) the purchase side of the D.G.S., New Delhi;
- (ii) the purchase side of the D.G.M.P., Calcutta;

- (iii) the purchase side of the offices of Controllers of Supplies; and
- (iv) the office of the C.A.O.(P), the constitution and functions of which are set out in the succeeding paragraphs.

Any further recruitment was to be made to the new Purchase Branch. The posts of the C.C., and the Dy. C.C., I.S.D., and the Director and the Deputy Director of Contracts were held in abeyance and instead two posts of Chief Controllers of Purchase (Supply) and (Munitions) respectively and two posts of Deputy Chief Controllers, one attached to each Chief Controller were created. All posts whether permanent or temporary in the I.S.D. or the Contracts Directorate were continued on 1st August, 1941. The existing and accruing rights of military officers serving in the Contracts Directorate were safeguarded.

Administration Sections already existed on the purchase side of both the Directorates General. These sections were strengthened and the Administrative Officers (who were to be directly responsible to the Chief Controllers) were expected to deal on their own responsibility, but subject to the general supervision of the Chief Controllers, with all administrative work hitherto disposed of locally including the creation and filling of posts with the appropriate financial and administrative sanctions of temporary non-gazetted posts. Administrative matters were to be the responsibility of the Chief Administrative Officer who was in effect to perform the functions of the C.C., I.S.D., and the Director of Contracts as heads of their respective departments and with whom A.Os. (again subject to the general supervision of the C.Cs.) were authorised to correspond directly. Chief Controllers were not required to adhere to any rigid distinction between purchase personnel drawn from the I.S.D. and the Contracts Directorate and could use their staffs to the best advantage.

The C.A.O. was placed directly under the Main Secretariat and was responsible for matters such as recruitment, appointment, pay and allowances, promotion, transfers, leave and increments. He also dealt with memorials and representations of the gazetted staff, personal records, communal proportions and maintenance of connected rosters, and lists of permanent posts, legislative business concerning the Purchase Branch as a whole, registration of contractors, collection and preparation of statistics for the Purchase Branch as a whole, administration report, war diaries, intelligence summaries and other reports which were to be submitted in a co-ordinated form for the Purchase Branch as a whole. The intention was to relieve the Chief Controllers of as much detailed administrative work as possible.

CHAPTER VIII

PROVINCIAL ORGANISATIONS (CONTROLLERS OF SUPPLIES, THEIR DUTIES AND FUNCTIONS)

It has already been shown how the early demands of war supplies were met by a Headquarters Organisation directing and controlling the activities of the two principal pre-war purchase organisations of the Central Government and that even in early stages it was found necessary to have Liaison Officers and Advisers from industries most prominently affected. The Supply Department's organisation had extended to the Provinces, only to the extent that the Purchase Organisations and the Advisers etc., were located in Provincial areas.

Appointment of Controllers in six Major Provinces.—Owing to heavy demands for jute, it was considered necessary to appoint a Controller of Supplies for Bengal as early as December, 1939, and an Advisory Committee was constituted for this Province in March 1940. As the demands for war supplies increased, the capacity of the whole country had to be harnessed to war effort and to make the best use of the industrial resources, existing and potential, it appeared necessary to have a Supply Department representative at different important centres of India to co-ordinate all supply activities. The organisation was extended to other provinces and appointments of Controllers were made in the Punjab, U. P., Sind, Bombay and Madras. All the Provincial Governments were informed of the action proposed to be taken to expand the activities of the Supply Department. It was also hoped that the Local Governments would consent to setting up Provincial War Supply Advisory Committees on the lines of one already set up in Bengal. The Provincial Governments' response was very encouraging and by July 1940, Provincial War Supply Advisory Committees had been constituted by the Governments of Bombay, Punjab, Sind, Madras and United Provinces. The Controllers of Supplies had also been appointed by this time in all the six provinces. Some Provinces, such as C. P. and Berar, Bihar, Orissa, North-West Frontier and Assam had no Controllers. Suggestions were made to neighbouring provinces to take representatives from these provinces on to the Advisory Committees set up by them.

India was thus divided into six circles with centres at Calcutta, Bombay, Madras, Karachi, Cawnpore and Lahore. The Controller of Supplies was the head of each Circle and he located manufacturing capacity at civil and railway workshops. Industrial Planning Officers were also stationed at each Centre, to assist the Controller in developing capacity. Each Controller had also the benefit of advice and assistance from the Provincial War Supply Advisory Committees, which were largely composed of non-officials in touch with trade and production. The primary task of the Controller was to arrange for planning, procurement and shipment or delivery of all and any type of supplies that would be secured or manufactured in his area in accordance with orders. The Industrial Planning Officers located the capacity and reported it with full details of plant, power, building, transport facilities, materials, labour and site to the two Directorates General.

The Chief functions of the Provincial War Supply Advisory Committees were to advise the Department on the difficulties they might experience in providing war supplies and to resolve them where possible. The Committees were also supposed to discover and make arrangements for the provision of articles required in view of the proposed expansion of the Indian Army not hitherto manufactured in India.

Duties and Functions of Controllers.—The Controllers of Supplies exercised such powers and performed such duties as were conferred or imposed upon them by the Central Government from time to time. They dealt with Main Secretariat of the Supply Department direct in all matters of general policy and administration, but referred cases relating to the actual procurement of supplies.

to the Directorate General concerned. They established and maintained contact with the Governments of the Provinces and Indian States with which they were concerned and with the important Commercial and Industrial Associations (such as Chambers of Commerce) in their respective Circles, and made any suggestions etc., to the Central Government. The Controllers were empowered to make purchases up to an amount not exceeding Rs. 100,000 subject to certain restrictions. In the beginning, all purchase was centralised, but from 1st August, 1941, certain items such as aluminium-ware, ball and bearings, bedsteads and charpoys, iron buckets, brooms, eyelets, firewood, glue, kettles knives and handknives (all kinds), polishes (boot and metal) etc., etc., were de-centralised and were ordinarily to be purchased by the Controllers of Supplies. The Controllers received indents for these items direct and also received cross-mandates from the Directorates General for indents for which they had located capacity or which could be easily met from their areas. When they received an order, they had to follow the usual procedure, system of open or advertised tender, limited tender, single tenders etc. The Progressing Organisation in the circles was also placed under the Controllers of Supplies and active progressing of orders was entrusted to the Progress Officers and their Assistants. The Controllers were expected to undertake any enquiries and miscellaneous executive duties required of them by Supply Department. They had also been given certain powers under the Defence of India Rules to issue 'Demands for Information' and to 'freeze' stocks but had no power of requisitioning. They also made arrangements for receipt and despatch of cargoes through the Circle Shipping Officers, who had close liaison with them. In short, the Controllers of Supplies except that of the Bengal Circle, were the chief representatives of the Government of India in the Supply Department in their respective areas. The position of the Controller of Supplies, Bengal was a bit different as there were special features in this Circle, the D.G.M.P. being located there.

The Foodstuffs Directorates in the D.G.S. were transferred in January 1943, to the new Department of Food. A Department of Industries and Civil Supplies was also created with effect from the 22nd April, 1943. The Supply Department allowed these Departments to use their Controllers of Supplies Organisation for certain fixed purposes, such as investigation as to the existence or stability of firms, assistance to contractors to secure materials and to arrange storage accommodation, serving of Demands for Information under the D.I.R. etc. Later, after the creation of the D.G.D. under the Supply Department, the Controllers also began to function as its regional representatives.

Broadly speaking, the functions of the Controllers of Supplies were many and precise definition is difficult. They extended over the whole field of supply in general and included responsibility within their circles. In addition to purely purchasing functions, their duties included the maintenance directly and through Provincial War Supply Advisory Committees, Commercial and Industrial Associations of the closest contact with industry in their circles. In short, each Controller was a friend, philosopher and guide to all suppliers of war stores.

CHAPTER IX

DECENTRALIZATION AND AFTER—CREATION OF VARIOUS DIRECTORATES AND SECTIONS IN THE DIRECTOR GENERAL OF SUPPLY AND ITS GROWTH.

As already stated; with effect from the 1st April, 1940, the Department was re-organised into (a) Secretariat and (b) six executive offices styled as Directorates, viz., Textiles, Engineering, Chemicals, Statistical, Indents and Timber. Soon after the Indents Directorate was divided into Indents and Miscellaneous Stores Directorates, the former being responsible for receipt of indents, export licences, imports, shipping and railway priorities and the latter for all stores which did not fall to the responsibility of any other Directorate.

Owing to enormous demands for "hardstores", the executive work was divided in July 1940 between the two Directorates General to be known as D.G.M.P. and D.G.S., the former being, broadly speaking, responsible for "hardstores" and latter for "general and soft stores" with headquarters at Calcutta and New Delhi respectively.

Consequent on the transfer of the control of Ordnance Factories to the Supply Department in August 1940, a Clothing Directorate was set up for the control of Clothing Factories and a Leather Manufactures Directorate for Harness and Saddlery Factory, and such items as hides, skins, etc., being dealt with by the Textiles Directorate were also transferred to the Leather Manufactures Dte. A Co-ordination Directorate to co-ordinate the work of all the Directorates and deal with general policy questions was also formed.

With the de-centralisation of December 1940 both the Directorates General were made self-contained units and the two Directors General were gazetted as *ex-officio* Additional Secretaries to the Government of India so that they could issue any order which a Secretary to the Government could issue with financial concurrence. To assist them in performance of these duties, a Branch Secretariat was established in each Directorate General.

The procurement work of foodstuffs and the operation of controlled flour mills and Ghee installations hitherto being the responsibility of the contracts Directorate under the O.M.G., was entrusted to the D.G.S. and a Foodstuffs Directorate was created in December 1940 for this work.

1941.—During 1941, the important features were the establishment of a Vehicles Directorate, the transfer of responsibility for procurement of medical stores to the Supply Department, establishment of clothing circles, splitting of the Textiles Directorate into Textiles Directorate at Delhi and Cotton Textiles Dte. at Bombay and the creation of a separate Purchase Branch. In January 1941 a Vehicles Directorate was established for the procurement of motor vehicles required by the Defence Services.

Consequent on the establishment of the Eastern Group Supply Council in February 1941, heavy demands particularly for cotton textiles were placed on India which resulted in the normal peace-time method of tender being abandoned. Prices in market began to rise sharply and the method of negotiations with individual mills was tried but this too was not a great success. The only alternative left was joint negotiations with industry. It was also decided that the Cotton Textiles Section of the Textiles Directorate should move to Bombay to be in close and continued touch with industry and its leading representatives. A separate Directorate was formed in Bombay in October 1941 and began to deal with planning and purchase of entire cotton textiles requirements. The Textiles Directorate in Delhi was left with woollens (including blankets), and jute items, silk (parachutes), webbing (all cordage items), other than cotton cordage and miscellaneous items such as pith-hats, etc.

1942.—The important events in the organisation were creation of a separate Petroleum Products Directorate, Controller of Rubber's organisation, A.R.P. Directorate, a separate Tanning and Footwear Directorate, splitting of Miscellaneous Stores Directorate, creation of a Paints and Gases Directorate, splitting of Foodstuffs Directorate into three separate Directorates and abolition of the Co-ordination Directorate.

Up to November 1941, the Chemicals Directorate remained responsible for petroleum products also. It was then felt that the work was increasing owing to several factors, viz., control over Lease-Lend shipments, procurement of all types of oil equipment required for the distribution of petroleum products, administration of several controls and acuteness of general supply position of petroleum products. A separate Petroleum Products Directorate was, therefore, created in January 1942.

With the loss of Malaya, etc., the rubber position became critical and measures for conservation and increased production became necessary. Some sort of control over the prices, exports and imports was essential. It was, therefore, decided that raw rubber including production, price control, its imports and exports, scrap and waste and distribution to manufacturers should be taken over by the Commerce Department and the rubber manufactures handled by the Supply Department. A Controller of Rubber Manufactures was appointed by the Supply Department to examine and assist it in formulating decisions as to the essential needs for Defence and civil purposes. A Rubber Manufactures Control Order was also promulgated. The constant danger of air attacks on civilians resulted in heavy demands for A.R.P. stores and in March 1942 an A.R.P. Directorate to deal with all A.R.P. stores was constituted.

The programme confronting the Department in connection with the leather industry was very difficult of fulfilment because not only demands had increased but the sources of supply within the Eastern Group had closed. Six Leather Manufactures Circles were established in provinces and it was felt that it could no longer deal with raw hides, tanning and control and distribution of leather and a new Directorate of Tanning and Footwear was created to deal with these items. Later on a Controller of Leather and Tanning Industries was also appointed in August 1942 with headquarters at Cawnpore.

Requirements of paints and gases were becoming so considerable and problems involved so complicated that about July 1942 they could no longer be dealt with by the Miscellaneous Stores Directorate in addition to the large number of items already assigned to that Directorate. A Paint and Gases Directorate was established to deal with items of paints and gases.

The Foodstuffs Directorate was becoming unwieldy and it was split into three Directorates—Directorates of Processed Foodstuffs, Agricultural and Dairy Produce and Foodstuffs Supplies.

The Director, Co-ordination, who was also an *ex-officio* Deputy Secretary had hitherto been in charge of the Central Indents and Co-ordination Sections. It was felt in December 1942, that the work involved was more or less of secretariat nature. The post of Director was abolished and the work entrusted to two Assistant Secretaries in the Branch Secretariat (Supply).

1943.—During 1943 the main changes were transfer of Foodstuffs Directorate to the newly created Food Department, creation of a Rubber Manufactures Directorate, splitting up of the Timber Directorate into three separate Directorates, setting up of a Medical Division, transfer of the Cotton Textiles Directorate, Bombay, to the newly created Deptt. of Industries and Civil Supplies and creation of a separate Controller of Chemicals.

In January 1943 a new Department of Food was created and the Foodstuffs Directorates (Foodstuffs Development, Agricultural and Dairy Produce and Foodstuffs Supplies) were transferred to it. The demand for rubber manufactures was increasing and a programme for rationalisation of the rubber

industry involving the planning of production and consequent allotment of orders in line with rationalised planning was to be carried out. A Directorate of Rubber Manufactures was, therefore, formed on 5th January 1943 and the A.R.P. Directorate amalgamated with it. This Directorate took over all rubber manufactures hitherto dealt with by different Directorates, viz., rubber hose of all kinds, tubes of all kinds, tyres, etc.

The then existing Timber Directorate was becoming unwieldy and it was difficult for one Director to perform the manifold duties efficiently. It was, therefore, decided to split it into three Directorates (Timber Supplies, Woodware and Timber Depots and Sawmills).

The arrangements under which the D.G.I.M.S. who had many non-civil functions to perform acted as part-time officer of the Supply Department were not very satisfactory. The matters came to a head when it was pointed out by F. A. that with the increasing importance of civil provisioning, the debiting of all expenditure on the Depots to H.M.G. in the first instance might not be fair. On this criticism, a review of the whole position was undertaken. The probability that the scope of civil provisioning would in the near future be greatly widened made it necessary that the position should be re-considered. After prolonged discussions, it was decided that procurement should physically be separated from provisioning and should be located in the Supply Department. This Department was made responsible for procurement of civil and military (Central), Regional and Overseas medical requirements. A separate Medical Division was established under the Directorate General of Supply under a Deputy Director General.

With the heavy in-take of consumer goods by the Defence Services, the civil market was almost denuded of essential items. To look to civil needs, a new Department of Industries and Civil Supplies was created and it was decided that as the main customer of cotton textiles was still the civil public, this item should be the responsibility of the new Department. Accordingly, the Cotton Textile Directorate was transferred *en bloc* to the control of that Department from 15th May 1943. With the increase in the number of chemicals brought under control and proposed widening of scope of the controls, the work connected with it grew in volume as well as in importance. This was previously shared partly by the Commerce Department and partly by the Chemicals Directorate. A separate Controller of Chemicals was entrusted with the task of controlling distribution of all chemicals under control and the post of Controller of Heavy Chemicals was abolished.

1944.—The main features were creation of a Paper Directorate, amalgamation of the Controller of Chemicals and the Chemicals Directorate and creation of a Tyre Directorate.

Prior to April 1944, there was no centralised arrangement for procurement, development and production of paper and several Departments were dealing with this subject. The development and assistance was the responsibility of the Industries and Civil Supplies Department; provisioning was done by the Labour Department (Controller of Printing and Stationery) and procurement was done by the Supply Department. This resulted in lack of co-ordination and confusion. The War Resources Committee of Council, therefore, in April 1944 decided to entrust the procurement and development of paper to the Supply Department which established a Paper Directorate in the D.G.S. to carry out these functions.

The separation of control work from the Chemical Directorate did not work satisfactorily because planning of production was so intimately connected with the control of distribution that separation of these two functions involved overlapping, friction and delay, all resulting in ineffective action. When these two functions were separated a somewhat disproportionate importance was

attached to the fact that till then the Commerce Department were controlling distribution of the main heavy chemicals through their Controller of Heavy Chemicals. It was assumed that because the Supply Department would, when exercising this control, be carrying out the general policy of the Commerce and later on of the Industries and Civil Supplies Department it was necessary to have a separate organisation for the purpose. Experience, however, showed that this experiment had failed and it was decided to combine the direction and control of chemicals and to concentrate the responsibility in one officer. Thus from August 1944, the Chemicals Directorate was again placed under one Director and the post of Controller of Chemicals was abolished.

The Rubber Controller's organisation was hitherto responsible for planning and purchase of tyres; planning and purchase of other rubber manufactures; civil rationing of tyres and collection and utilisation of scrap rubber etc. The real pressure on Indian Tyre resources, however, began to develop only in 1944 as American Army Air Force demands were added to the schedules and demands for civil transport increased. Moreover, with the issue of the Tyre Rationing Order, 1943, the receipt and co-ordination of monthly stock returns from all provinces and states in respect of suppliers' stocks and arrangements for consequent movements of stocks, used tyres were brought under control. A Tyre Directorate was, therefore, created in July, 1944.

1945.—There were no important changes during 1945 except that after the Victory in Europe and over Japan, steps were taken to reorganise and reduce the organisation owing to the dwindling demands. Details how the shrinkage has occurred are given separately under an appropriate chapter.

CHAPTER X

DE-CENTRALISATION AND AFTER—CREATION OF VARIOUS DIRECTORATES AND SECTIONS IN THE DIRECTORATE GENERAL OF MUNITIONS PRODUCTION AND ITS GROWTH

The Engineering Directorate was one of the six executive offices styled as Directorates created in April 1940 and dealt with Engineering stores, iron and steel items, non-ferrous metals, mica, optical instruments, tin-plate, barbed and wire products. In June 1940, a Metals Directorate was created and both the Metals and the Engineering Directorates along with the Munitions Production Section were placed under a new Director General of Engineering appointed in June 1940. In July 1940, the designation of this post was changed to that of the Director General, Munitions Production, and the Directorate General was moved to Calcutta to enable it to be in close touch with the engineering industry.

An Ordnance Factories Directorate was formed to control the Ordnance Factories transferred in August 1940 to the control of the Supply Department. To implement the recommendations of the Chatfield Committee, a new Directorate of Factory Expansion was established and the two Directorates placed under the D.D.G. (Armaments Production). Early in September 1940, the Shipbuilding Directorate was formed to control construction and supervision of various crafts required both for operational and transport purposes. A Munitions Production Directorate was created to deal with munitions of all kinds.

With the de-centralisation in December 1940, the Director General of Munitions Production was made responsible for all munitions and engineering items and was appointed *ex-officio* Additional Secretary to the Government of India and a Branch Secretariat under a Joint Secretary was constituted to assist him in the performance of the Secretariat functions.

The Roger Mission's report on the civil production organisation in the Department was accepted and a Civil Production Division was formed in January 1941 as a separate Division and comprised the three Directorates dealing with Railways in British India, Trade in British India and the Trade in Indian States respectively. The recommendations regarding institution of machine tool control were also accepted and a Machine Tool Division to administer the Machine Tool Control was created.

1941.—During 1941, the main features were the creation of Armoured Fighting Vehicles Section, creation of a separate Purchase Branch, institution of the Iron and Steel Control, re-organisation of the Armaments Production Division, creation of Tool Planning and Stores Directorates.

In March 1941, the Commander-in-chief and the Master General of the Ordnance stressed the importance of keeping the production of armoured vehicles to schedule and an Armoured Fighting Vehicles Production Section was established under the Engineering Directorate.

With the coming into effect of the Iron and Steel Control Order in August 1941, the Adviser on Steel Supplies was appointed as the Iron and Steel Controller under the D.G.M.P.

Since the outbreak of the war, there had been a large expansion in the activities of the Armaments Production Division and various measures of re-organisation and expansion of the headquarters organisation had been carried out to enable it to cope with the growing load. The organisation, however, proved to be inadequate and a considerable re-organisation was necessary if it was to meet the increased load due to the sanctioning of E.G. Projects. A Chief Administrative Officer (Ordnance Factories) was, therefore, appointed and the Factory Recruitment Directorate was placed under him.

Due to reduction in imports, tool planning assumed a very important position in the munitions production. All stocks of imported cutting tools came under the control of Civil Armaments Production Division and the distribution of these involved a considerable amount of work. A Tool Planning Section was, therefore, organised in November 1941.

1942.—The chief changes during 1942 were re-organisation of the Civil Armaments Production and Commercial Divisions and the creation of the R.A.F. Maintenance Division, Commercial Directorate, Engineering (Structural and Mechanical) Directorate, Bolts, Nuts and Rivets Planning Section, the Directorate General of Shipbuilding and Repairs and the Aeronautical Stores Division.

The Civil Armaments Production Division was re-organised in February 1942. Several Controllers were appointed in Provincial Centres like Bombay, Madras, Lahore, Cawnpore and Karachi.

The D.G.M.P. was responsible for planning of capacity and the provision of materials required by the R.A.F. and for supplementing resources of civil firms by supplying technical personnel and skilled labour. The object was to provide by the use of capacity of civil firms in the Calcutta area for maintenance of Air Forces operating in Burma and North East India. So an R.A.F. Maintenance Directorate was created in February 1942.

The Statistical and Indents Sections and all correspondence relating to demands placed by the E.G.S.C. on India, import and export control and responsibility for quick completion of immediate purchase indents and weekly reports on them, etc., were dealt with by the Assistant Deputy Director General (Commercial) which entailed a heavy work on him. A Commercial Directorate was, therefore, established under a Director in March 1942 in the C.A.P. Division.

A new Directorate of Engineering Stores to deal with items of mechanical engineering not requiring the specialised and detailed form of planning undertaken by C.A.P. Division was set up and the designation was later changed to that of Director of Engineering (Structural and Mechanical).

Nuts, Bolts and Rivets Planning Section was created in June 1942 for planning of all orders in terms of Priority Authority decision, co-ordination of surplus railway capacity, if any, employment of the capacity of other small fabricators, etc.

In June 1942, it was decided to set up a new Directorate General of Shipbuilding and Shiprepairs and "Ship construction and repairs" which was hitherto fore the responsibility of the D.G.M.P. was transferred to the new organisation.

The Armoured Fighting Vehicles Section could not cope with the increased work. There were three major workshops engaged in Armoured Fighting Vehicles production besides a multitude of smaller firms engaged on components and it was decided to form a separate Armoured Fighting Vehicles Directorate under the C.A.P. Division in September 1942.

The American Technical Mission recommended that industry should be subjected to rationalisation and regimentation and in particular engineering concerns producing war goods should be re-organised on mass production lines and munitions production should be concentrated in a few large plants. To implement the recommendations, an Additional Director General (Rationalisation) was appointed at Calcutta to prepare and execute rationalisation schemes in the General Engineering Industry.

The R.A.F. Maintenance Directorate as it was then constituted was involved in responsibilities far beyond the original requirements. Originally Air Headquarters wanted a small organisation in the Calcutta area to repair damaged aircraft to be brought back from Burma or picked up locally and the arisings were very small. Experience in Mid-East showed that under operational conditions the arisings were likely to exceed considerably. In addition to the

manufacture of ground equipment the Directorate was involved in the purchase and manufacture of aircraft equipment due again to shortage of spares which was not anticipated. It was apparent, therefore, that the load on this Directorate had increased out of proportions and it was essential to divide the R.A.F. requirements into two units—Manufacture and Repair—co-ordinated in a separate Division. The R.A.F. Maintenance Directorate was, therefore, converted into a separate Division with two wings, one concerned with Manufacture and Planning and the other with Repairs.

The Electrical Section was converted into an Electrical Directorate in January 1943 as in addition to controlling the entire output of the Posts and Telegraph Workshops, Alipore and Nagpur, the Indian Cable Company's Factory at Tatanagar, the National Carbon Company and the Estrela Batteries Limited's production of batteries, the various electric lamps, electric fans and electric motor factories all over India numbering fourteen, the numerous porcelain factories working on insulators of all sorts, it was made responsible for the planning of large scale production of radio sets for army use and the work became unmanageable for a Deputy Director

1943.—During 1943, the main features were the re-organisation of the Ordnance Factories Division, creation of Railway Demands Directorate, formation of the Stores Control Accounts Section and creation of the Capacity Directorate, which was later replaced by a Transportation Directorate, creation of a Railway Demands Division and setting up of Munitions Production Directorates at Lahore and Bombay.

Owing to the increase in the production activities of the Ordnance Factories due to the launching of the E.G. projects, the responsibility for their co-ordination and control became greater and the Division was re-organised in July 1943 and placed under an Additional Director General (Armaments Production), who was assisted by a Deputy Director General, Chief Administrative Officer (Ordnance Factories), Chief Mechanical Engineer (Ordnance Factories) and Directors of Ordnance Factories and Factory Recruitment. As the Division was primarily concerned with the various aspects of the Indian Ordnance Factories, its name was changed to Ordnance Factories Division.

With the introduction of area rationalisation for railways workshops and in order to co-ordinate the work between this Directorate General and the Railway Board, a Railway Demands Directorate was created for collaboration with the railways concerned in technical questions, checking of all railway indents received from railways and assisting railways in getting supplies of raw material and stores as required for railway maintenance purposes, etc.

Early in 1943, it was decided to form a separate and self-contained Stores Accounts Control Section. It was agreed that the Accounts Officer (Workshops) who was responsible for the budget and accounting work should be given assistance to enable him to cope with the extra work.

A Capacity Directorate was formed to perform several important functions, one of which was the receipt and analysis for the statutory returns of capacity from the engineering firms. The Directorate began to work in March 1943.

In February 1943, Progressing Organisation was put on a sound basis, and a Directorate of Progress was created in D.G.M.P. as it was thought that difficulties in Calcutta were greater than New Delhi due to the fact that the Calcutta organisation was drawing very largely on the common pools of materials and that their work was very much interlocked.

The arrangement under which the engineering and munitions work in Provincial Circles was being done by the Controllers of Supplies was not working satisfactorily and it was felt that Munitions Production should have a separate organisation at Bombay and other places. So in 1943, two Directorates—separate from the Controllers of Supplies organisations—were set up in Bombay and Lahore to plan and purchase D.G.M.P. items.

With the formation of a separate Directorate General of Aircraft in the Department of Supply, the Aeronautical Stores Division, hitherto a part of the D.G.M.P., was transferred *en bloc* to that Directorate General.

The Railway Demands Directorate, hitherto a part of the Civil Armaments Production Division, was constituted as a separate Division comprising the Railway Demands and the Railway Wagons Directorates in September 1943.

In November 1943, all items relating to "capacity" were de-centralised and the Capacity Directorate which assumed responsibility for all transportation matters (shipping, railway and road) in addition to coal, etc., was re-named as Transportation Directorate.

1944.—The main features were the abolition of the Civil Armaments Production Division and creation of a Provision, Progress and Materials Division, re-organisation of Tools Division, etc.

In February 1944, the D.G.M.P. was re-organised, the Civil Armaments Production Division abolished and a new Division named Provision, Progress and Materials was constituted. The Structural and Mechanical Directorate was split up into two Directorates designed as Structural and Mechanical Directorates. The C.A.P. Directorate (General) was absorbed into the C.A.P. (Ammunition) Directorate and a new Repairs Directorate was constituted. Two new Directorates known as Machine Tool (Planning and Machine Tool Imports) were created. The C.A.P. Directorate (Small Tools) was transferred to the Tools Division and C.A.P. (Provision) Directorate to the Progress and Materials Division. The Repair and Non-Ferrous Metals Directorate were under the Co-ordination Division. The Progress Directorate was taken out of the Co-ordination Division and placed under the Progress and Material Division. The Armoured Fighting Vehicles and the Civil Engineering Directorates were transferred to the Railway Division.

The newly re-organised organisation in February 1944 was as follows:—

1. Co-ordination Division under D.D.G. (Co-ordination) comprising Transportation, American and Panel Imports, Non-Ferrous Metals and Repairs Directorates.
2. Progress and Materials Division under D.D.G. (Progress and Material) comprising Progress, Provision and Stores Directorates.
3. Engineering Division under D.D.G. (Engineering) comprising Structural, Mechanical, Welding and Press and Electrical Directorates.
4. Railway Division under D.D.G. (Railways) comprising Wagons, Railway Demands, Armoured Fighting Vehicles Directorates and Civil Engineering Directorate.
5. Tools Division under D.D.G. (Tools) and Machine Tool Controller comprising Planning, Manufacture, Imports and Small Tools Directorates.

The idea behind the re-organisation was to balance the burdens resting on different Deputy Directors General and to bring unaffiliated entities into cohesion and to provide for functions becoming increasingly necessary such as dealing with transportation problems with better efficiency, making adequate provision arrangements, to make articles available to contractors and to provide for the growing importance of the Railway Demands Division.

In early June 1944, the Tools Division was re-organised and the re-organised Tools Division comprised Tools Co-ordination, Machine Tools and Small Tools Directorates.

1945.—There were no important changes up to V. J. Day when contraction of organisation started.

CHAPTER XI

CREATION OF MICA INSPECTORATE AND ELECTRICAL COMMISSIONER

(a) **Creation of Mica Inspectorates.**—Mica was required in large quantities by the United Nations and particularly by the U.K. and the U.S.A. This was procured mainly through trade channels. In 1940, in response to a request from the U.S. Government, the Supply Department undertook to collect and submit to Washington, on behalf of the Ministry of Supply offers of mica to form a federal stockpile. In 1941, again at the request of the U.S. Government the Supply Department negotiated contracts with the Metal Reserve Company for the procurement of considerable quantities of splittings and block. Small orders for mica were received from time to time by the Supply Department from countries other than the U.K. and the U.S.A. (e.g., from Australia) and were met. Apart from meeting the demands referred to above, the Supply Department employed inspecting and certain special subordinate staff in connection with the certification of mica under the Mica Control Order and the control of export of mica from India, and advised the appropriate Departments on the administration of these controls. The Supply Department, in the interests of ensuring adequate supplies to meet the demands of the U.S.A. and the U.K., took charge of other mica matters, such as, certain schemes to increase production in Bihar and to help mica producers to obtain requirements essential for production. The Department, by arrangement with the Labour Department worked through Dr. Fox, Director, Geological Survey of India, who was in charge of all operations. Purchases were made through a Purchase Section detailed by the C.C.P.(M), Calcutta and mica was inspected by two Inspectors one in Bihar and one in Madras (Gudur). Messrs. Cox and Kings were employed for shipments against stockpile and contractual obligations.

In 1942, a Joint Mica Mission was appointed to represent H.M.G. and the U.S. Government and assembled in India. This Mission was made responsible for purchasing, inspecting, accepting, paying for and despatching all mica required by the United Nations. It also intimated that it would use the machinery established by the Government of India and that it would aim at beginning operations from the 1st August, 1942. It was necessary for some one Department of the Government of India to be responsible for relations with the Mission, for the settlement of questions of policy, and for approaching the appropriate Department for the exercise of statutory controls. It was, therefore, decided that the Labour Department should be responsible and should with effect from the 1st August, 1942, finally relieve the Supply Department of all functions connected with mica, subject to the exception that stockpile transactions and the obligations of the Government of India under the contracts with the Metal Reserve Company would be completed by the Supply Department. It was later decided that the entire staff of the Mica Examiner, Gudur, and of Mica Inspectorate, Kodarma (Bihar) should be transferred to the Joint Mica Mission with effect from 1st October 1942 and 16th December 1942 respectively and the Supply Department was relieved of its responsibility regarding mica.

(b) **Creation of the office of the Electrical Commissioner with the Government of India.**—Prior to January 1941, when the office of the Electrical Commissioner with the Government of India was set up under the administrative control of the Department of Supply, there was no Government agency concerned with public electricity supply throughout India. The necessity for such an agency became apparent when the Ministry of Supply Mission (the Roger Mission) arrived in India in September, 1940 and recommended the establishment of a considerable amount of munitions manufacturing capacity throughout the country. The Government of India accepted the recommendations of the Roger Mission and Mr. H. M. Mathews of the M.O.S.M. was appointed as Electrical Commissioner with the Government of India with effect from the

14th January, 1941. He was charged with the duty of setting up the electrical organisation contemplated in that Report. The initial motive behind the setting up of this organisation was to ensure that the Ordnance Factories and other industries engaged in important war work should secure all the electric power which they required.

As the war progressed, the functions of the Electrical Commissioner's Office extended considerably and included the general control of the development of public electricity supply, as well as a number of ancillary subjects. It collected statistical information regarding the electric supply industry throughout the country and dealt with the air-raid precautionary measures in public electricity supply undertakings and in the electrical plant of large factories of special importance to the war effort; plans for the denial of heavy electrical plant to the enemy and removal of plant from vulnerable areas and its re-erection in safer areas were also dealt with by it. This organisation was also responsible for the provision of power with the minimum of delay in strategic areas where no power stations existed.

A Directorate was set up to deal with the progressing and co-ordination of power expansion projects and to help undertakings to carry out their extensions expeditiously. Almost all equipment, materials and facilities required by the undertakings to carry out extensions were provided through the efforts of this Directorate, the total expenditure on which was in the neighbourhood of Rs. 15 crores. The Directorate had to remain in constant touch with the Economic and Overseas Department of India Office to get special help or priority assistance.

The organisation also assisted the electrical industry to procure heavy plant and machinery from abroad and drew up emergency power restriction schemes to ensure that essential services and the most important war loads should not be without power in emergencies or due to shortage of plant. Rationing of coal and fuel oil available to electric utilities and devising control schemes to provide against shortages of such fuel supply also fell within the scope of its activities. Some special functions such as assistance to the firms concerned in the production of aluminium in India and rationalisation scheme for the jute industry were also assigned to this office.

The organisation worked directly under the Main Secretariat.

CHAPTER XII

CREATION AND GROWTH OF THE INDIA SUPPLY MISSION IN THE UNITED STATES OF AMERICA

As the War began to extend, India with her vast resources became the main reservoir of supplies for the entire war zone extending from the Mediterranean to the Pacific. In spite of her natural resources, India's actual production of many of the war supplies was largely conditioned by her ability to secure certain essential material like plant, machinery, machine tools and finished steel, etc., from abroad. Supplies from European and other Eastern group countries became difficult and America with her vast natural and industrial resources was in a position to supply aeroplanes and ships, guns ammunition and innumerable other equipment and other raw material required for the successful prosecution of war.

When the procurement of these supplies was facilitated by the passing of the L/L Act, the Government of India considered it essential to have their own agency in the U.S.A. for obtaining vital supplies and in the month of July 1941, the India Purchasing Mission was established in New York. The Mission was to be similar to the organisations established for American Purchases by other Empire Governments.

The increasing shortage of goods in Sterling area and the spreading need of India's war economy led quickly to a very considerable expansion of the Missions activities and its functions gradually extended over the whole question of securing for India the materials she needed. Generally speaking the mission came to be looked upon as the "eyes and ears" of the Government of India in all matters relating to the supply of goods and services from North America and Canada. With the wider scope of its duties, the name of the Mission was changed in 1942 to the India Supply Mission and its headquarters shifted to Washington D.C.

The Mission had to work in close consultation with the British Purchasing Mission and was considered as a liaison office between the Supply Department, U.S.A. Government and the American Trade.

In the beginning the Mission consisted of a Head, a Secretary and a Director of Supply with necessary technical and clerical staff. It was divided into three Departments—Procurement, Priority and Export Licences and the Shipping Departments. The Mission began to handle:

- (a) all orders for supplies placed by the Government of India against dollar credits;
- (b) all lend-lease requisitions which had to be passed to the American Administration through the British Purchasing Mission; and
- (c) all applications of American suppliers for priorities against Indian Import licences, and connected correspondence with Indian importers and licencing authorities in India.

The Head of the Mission was given full authority to organise the Mission's office, to create posts and make purchases on behalf of the Government of India. In the beginning the Indian Trade Commissioner in New York was appointed to act as Secretary in addition to his own duties, but later on a full time Secretary was sent by India Office.

Under the Head of the Mission, there were three Branches—Consultation, Secretariat and Supply. Under "Consultation", there were technical officers to advise the Mission regarding Locomotives, Canteen Stores and Vehicles. The Supply side was under a Director assisted by Deputy Directors for various Stores such as medical supplies, ball-bearing, steel, engineering, machine tools, etc. The Secretariat was composed of a Secretary who had Deputy and Assistant Secretaries, Establishment Officers etc., under him. On V. J. Day the total strength of the Mission's staff was 102.

The main function of the Mission was to establish India's claim for Lease-Lend aid and in this they had to prove categorically that what India wanted was directly or indirectly related to her war effort and that the Government of India exercised the strictest control in the actual use of these materials.

The Mission kept pace with changes in the character of Lease-Lend aid to India and its functions grew with the increasing pressure on supply and again with the increasing number of commodities which became eligible for Lease-Lend on the basis of essentiality and short supplies. The functions of the I.S.M. broadly, have been to assist in obtaining for India its essential needs under circumstances of increasing supply tightness, difficult shipping, etc. In the beginning it was a question of Lease-Lend co-existing with commercial imports, limited as they were by the dollar exchange position. But with increasing military demands everywhere and shipping restriction, the classes of goods potentially eligible for lease-lend could cover almost anything on which a definite minimum national demand could be declared. But, at the same time, difficulties of procurement were proportionately greater and to obtain from India the basis on which the demand was made, to put before the American Organisation a statement of the position, side by side with other demanding countries equally clamorous, represented a task of increasing magnitude. The Mission procured various direct and indirect requirement such as steel, machine tools, ball and roller bearings, vehicles, ship-building and repairing materials, aircraft spares, road-making machinery, engineering plant and machinery, electrical equipment, scientific instruments, railway, dock and harbour equipment, oil and lubricants, desivac equipment, etc. More remotely concerned with defence but on grounds of essentiality, the Mission also procured agricultural machinery, fertilisers, dyestuffs chemicals, medical and surgical stores, water supply plant and machinery, chemical plant and machinery textile plant, machinery and equipment, bichromates, chlorate of potash, radio sets, typewriters, seeds, etc.

In addition to the procurement of supplies for cash or under Lease-Lend, the Mission had been performing the following duties:

- (a) Procurement and shipment of supplies needed by the Government of India, Provincial Governments and public bodies.
- (b) Investigation into supply possibilities and prices for Governments and private business.
- (c) Technical training of Indian personnel.
- (d) Aid to industrialists by way of investigation of sources and prices, inspection of equipment, negotiation and assistance in purchasing, securing necessary priorities and export licences in respect of orders placed by Indian importers on American Manufacturers.
- (e) Technical investigation and assistance with special reference to the assimilation of information relating to latest changes and developments in processes; the production of designs and working drawings, and the employment of consulting experts.
- (f) Making financial arrangements for payment for goods ordered by the Government of India through other channels.

- (g) Maintaining close contact with business, industry and Government in America.
- (h) Assisting visiting Government officials and business in all supply matters.
- (i) Representing India on an International Conference such as the United Nations Conference at San Francisco, Far Eastern Mission in Washington, U.N.R.R.A. in Atlantic City, the I.L.O. Steel and Metal Trades Conference at Cleveland, the International Cotton Advisory Mission in Washington, etc.

One indication of the magnitude of the Mission's work was the fact that during the financial year 1945-46 the Mission handled and had to account for over 62 million Canadian and 36 million U.S.A. dollars.

In India, its parallel organisation, the American Purchase Section of the **Supply Department**, collected and collated all demands and enabled a broad picture of India's requirements to be featured in its proper perspective.

CHAPTER XIII

INDIAN STORES DEPARTMENT INSPECTORATE—TRANSFER TO THE WAR DEPARTMENT

All war supplies must be inspected and accepted by Government Inspectors before the same are allowed to go forward. Inspection Notes are issued by Government Inspectors to contractors for stores accepted to enable the latter to obtain payment from the Accounts Officer concerned, as payments to contractors are made on the authority of the Inspection Notes only.

The Indian Stores Department arranged the purchase and inspection of stores on behalf of its indentors. There was a Director of Inspection at headquarters who had under him six Provincial Circles at Calcutta, Bombay, Lahore, Madras, Karachi and Cawnpore; Metallurgical Inspectorate and the Government Test House, Alipore. This organisation was undertaking the analysis, tests and investigation of chemicals and other stores and inspection of material purchased. Where necessary, inspection in the country of origin was also arranged through the Director General, India Stores Department, London. The Inspection Branch was also responsible for the preparation and revision of specifications and schedule of requirements, technical scrutiny of engineering indents, examination of schemes and work connected with "Standardisation" and "Standards and Specification Committees" of Railways and technical supervision of the work of the Provincial Inspectorates. Other functions were preparation and issue of drawings, standardisation, custody and control of samples, work relating to development of indigenous products and technical advice to the Purchase and Intelligence Branches of the Department. The Branch had also been entrusted with the custody and keeping of up-to-date master copies of Army Specifications and Drawings.

Soon after the transfer of I.S.D. and its Inspectorate to the Supply Department in April 1940, it was considered necessary to have close co-ordination between the Ordnance and the I.S.D. Inspectorates to avoid over-lapping and to employ both the Inspectorates to the fullest advantage. The Ordnance Inspectorates were, therefore, given the inspection of orders where depot inspection was considered the most suitable while the I.S.D. Inspectorate were entrusted with the inspection of orders where inspection at firm's premises was considered necessary.

In December 1940 when the Department of Supply was re-organised the Inspection Branch of the I.S.D. was separated from its Purchase side and split into Engineering Stores and General Stores Inspectorates with headquarters at Calcutta and New Delhi respectively. Both the Inspectorates were made technically responsible to the M.G.O. but the establishment cases were to be submitted to Main Secretariat of the Supply Department. The Engineering Inspectorate covering Calcutta, Tatanagar, Hiraapur, Lahore and Karachi Circles of I.S.D. was placed under the immediate charge of the Director of Inspection, Calcutta, and the General Stores Inspectorate covering Madras, Bombay and the Cawnpore Inspection Circles of the I.S.D. under the technical charge of the Deputy Director of Inspection but under the executive control of the Military Controller General of Inspection with headquarters at New Delhi.

The Inspection Branch was again re-organised in August 1941 and the entire I.S.D. Inspection Organisation was combined to form a Civil Wing and placed under the control of the C.G.I. acting on behalf of the M.G.O. An Inspectorate of Engineering Stores was formed at Calcutta and consisted of a Civil and a Military Wing, the former to deal with all stores indented for by Civil Departments and D.G.M.P. for armament production and the latter to deal with all Military Engineering Stores whether indented for by the E.-in-C. or by the D.D.O.S.P.

Experience showed that the above arrangements were inconvenient to work in practice and caused delay in the settlement of administrative questions. It was, therefore, decided to transfer the administrative and executive control of the Inspectorate of the I.S.D. from the Supply to the Defence Department with effect from the 1st May 1942 for the duration of the war and later on when this Department was re-designated as War Department from 20th July 1942, the I.S.D. Inspectorate was also transferred to that Department. The transfer of control speeded up the elimination of the over-lapping of Inspection and resulted in better co-ordination between Inspection Organisations.

Considerable expansion has taken place in the organisation of the I.S.D. Inspectorate since its transfer to the War Department but it is not necessary to give details here.

CHAPTER XIV

CREATION AND GROWTH OF THE DIRECTORATE GENERAL OF SHIPBUILDING AND REPAIRS

Creation of Shipbuilding Directorate.—Prior to the declaration of war in September, 1939, India with the exception of the few established firms in Calcutta, Bombay and Karachi, knew little of shipbuilding to a laid down specification, Admiralty or Commercial. Owing to the deterioration of the war situation in early 1940, the case had to be reviewed, observing that the U.K. capacity was fully absorbed and long sea communications were becoming day by day more precarious. The limitations of the existing established shipbuilding firms in India were ascertained and their capacities for building certain types were considered. Admiralty requested capacity for mine-sweeping and escort vessels and undertook to supply main propelling machinery together with auxiliaries, boilers, electrical equipment etc., provided India undertook hull construction and completion. A Directorate of Shipbuilding was created under the Directorate General of Munitions Production, Calcutta.

Initially India accepted the commitment of 10 Basset Class A/S-M/S Trawlers, 2 Bangor Class Minesweepers and 4 L/L Motor Minesweepers. The Motor Minesweepers were allocated to Cochin in South India with a firm. As further Motor Minesweepers were projected and in view of the firm's inexperience of building to Admiralty specification, it was considered essential that a Deputy Director should be established there with a resident Inspecting Officer to coach the firm along.

Creation of Ship Repairs Directorate.—The Commercial Ship Repair Industry in India in peace catered for inter-voyage repairs of ocean-going tonnage and for the small number of ships plying solely in Indian waters and consisted of 15 Repair firms. In addition, the Port Trust at ports possessed workshops employed on the maintenance of their own craft. At Bombay and Calcutta, there were dry docks capable of taking large ships and there were smaller docks at Karachi, Cochin, Vizagapatam. Repairs to Naval ships of the R.I.N. were undertaken in H.M.I. Dockyard, Bombay, which had two dry docks, one of which could take "Dido" and "Arthusa" class cruisers, and the other all classes of destroyers.

During the latter part of 1941, the Dockyard and the Commercial Firms were called upon at short notice to cope with a great increase in work due to ships operating in the North African area being diverted to India for repairs and by the beginning of 1942, with ships from the Pacific. Moreover, India had also to shoulder part of the repair work that the U.K. yards could no longer undertake. In order to acquire an up-to-date knowledge of the situation, the Admiralty in January 1941, despatched Vice-Admiral R. R. Turner, C.B., D.S.O., to visit and report on the facilities at South African and Indian ports. As a result of these reports and of negotiations between the Admiralty and Ministry of War Transport, proposals were put forward to appoint Admiral Turner to co-ordinate the repair of all warships and merchant ships in India. After agreement with the Government of India, Vice-Admiral Turner was appointed on the 1st December, 1941, as Director of Ship Repairs in India to work under the general control of the Flag Officer Commanding, Royal Indian Navy, and Mr. W. A. Henderson was appointed as the representative of the Ministry of War Transport.

On the 29th January 1942, the Government of India set out the Director of Ship Repairs terms of reference, which were co-ordination of the repairs of all warships and merchant ships in India and to speed up the turn round of ships using Indian Ports by improving arrangements of repairs and docking. The Director was also to make proposals regarding "the advisability of his assuming similar responsibilities in respect of New Construction" as with ship repairs and conversions.

Creation of a Directorate General of Shipbuilding and Repairs.—The Repairs to Ships Order of 1940, according to which merchant ship repairs were received and divided between firms according to available capacity, was already in being and was taken over by Admiral Turner and his staff from the Principal Officer, Mercantile Marine Department. The Director and the representative of the Ministry of War Transport toured India and advised firms of the load to be expected and the necessary increase in materials and machinery that would be required to meet this load. The organisation, at that time, had little knowledge of Indian conditions and it was not until they met the Supply Department officials that they obtained any definite direction as to how best to stimulate and arrange supplies for Indian capacity. Even with this information the organisation because it represented at that time only H.M.G. interests, had little *locus standi* in India; although firms realised the difficulties facing them, they treated advice with indifference and, after some time, the Supply Department, seeing that little progress was being made, proposed the formation of a Directorate General under them thus almost breaking the link between Admiral Turner and his staff and Flag Officer Commanding, R.I.N. An administration Officer—later designated as Director of Co-ordination—was sent to Bombay by Supply Department to get the office into shape and a few months later the Co-ordination Directorate was formed and made responsible for policy questions, materials and labour questions, references to the Government of India including sanction to schemes and general administration and establishment matters. With this re-organisation, the co-ordination and control of all Shipbuilding, Merchant and Naval ship-repairs were concentrated under the aegis of the Director General, Shipbuilding and Repairs.

The Director General, Shipbuilding and Repairs, was made responsible for the execution and co-ordination of—

- (a) Repairs to R.N. Ships;
- (b) Repairs to R.I.N. and L.N.D. Ships;
- (c) Conversion jobs;
- (d) D.E.M.S. work;
- (e) Work for S.T.O.; and
- (f) Degaussing work.

It was also ordered that the Plastic Armour Officer and the L.L. Sweeps Fitting out Officers and the D.E.M.S. Officer at Headquarters should work entirely under the Director General's direction. The supervision and co-ordination of the working of the H.M.I. Dockyard, Bombay, was also assigned to him though administrative responsibility for the Dockyard remained with the Captain Superintendent and Flag Officer Commanding, Royal Indian Navy.

There were three Main Directorates—Directorates of Shipbuilding, Merchant Ship Repairs and Co-ordination. The Shipbuilding Directorate designed specifications for all types of craft to be constructed, placed orders with private shipbuilders, gave technical advice, arranged tests, trials, inspections, etc. The Merchant Ship Repairs Directorate attended to ship repair policy, allocated ship repair work, issued licences, arranged survey and inspection of ships under repairs, and kept close liaison with ship repair firms and the Ministry of War Transport. The Co-ordination Directorate dealt with general matters, reports, returns, assistance to firms, frustrated cargoes, statistics, etc.

In peace, shipbuilding had been limited to building small launches, yachts, etc., but to meet war needs the building of trawlers was commenced in 1940, in Calcutta utilising engineering capacity and drawing steel from Indian production nearby. The demand for wood was met largely by West Coast firms hitherto unconnected with this class of work as timber was more readily available here than on the East, and enemy air attack less likely. Later, steel vessels such as "Z" craft were made by the West Coast firms and timber craft

production spread to Madras, Cocanada and Vizagapatam. Conversions for naval purposes of merchant vessels together with D.E.M.S. work and the Degaussing and ranging of ships had to be arranged.

Creation of a Branch Secretariat (Shipbuilding and Repairs).—With effect from the 1st October, 1944, it was decided to establish a Branch Secretariat (Shipbuilding and Repairs) under a Deputy Secretary and attach it to the Directorate General of Shipbuilding and Repairs at Bombay. It began to deal with all references regarding appointments, establishment of the Directorate General and all matters of policy and day-to-day administration. The Director General was not, however, like other Directors General ex-officio Additional Secretary to the Government of India.

Purchase Branch.—The Purchase Branch attached to the D.G.S.R. was entrusted with the work of negotiating and settlement of contracts for shipbuilding and for the purchase of miscellaneous marine equipment. With the constitution of the Shipbuilding Directorate in 1940 the purchase work mostly contractual agreements with the shipbuilding firms and for "Z" craft and Basset trawlers, devolved on the Chief Controller of Purchase (Munitions). On the establishment of the separate Directorate General of Shipbuilding and Repairs, with headquarters in Bombay in 1942, it was considered desirable that the shipbuilding work be co-ordinated with shiprepair work as same firms were generally employed on both types of work. Upto May, 1943, D.G.S.R. continued to have the part-time services of the Purchase Branch of the Controller of Supplies, Bombay. As the demands particularly for wooden craft grew, a whole time purchase branch was formed under a Deputy Controller of Purchase and attached to the D.G.S.R. This Branch placed orders mainly in Bombay and Karachi; but the C.C.P.(M) continued to place contracts for any demands for shipbuilding and boat construction required in Calcutta.

Finance Officer accredited to the D.G.S.R.—Even before the ship-repair organisation was constituted as a Directorate General in the Supply Department, a Branch of the Supply Finance Department had been working in Bombay to advise other units of the Supply Department located in Bombay. On the formation of the D.G.S.R. the activities of this Branch were extended to include financial advice to the D.G.S.R. A D.F.A. was attached to the organisation in June, 1943. The financial measures of the D.G.S.R. consisted mainly of the development of his own organisations, acquisition of stores for use on ship-repairs and ship-building, development of industrial capacity to meet the specific war-time requirements of ship-repairs and shipbuilding and the placing and administration of contracts on private firms for carrying out the work. In all these measures the D.F.A. was required to play an important part, by actively participating in the negotiation and the administration of the contracts for the ship-building and ship-repair work, as also for the use of the industrial capacity built with Government assistance.

Organisation on V. J. Day.—The control of all the activities narrated above in the various ports and at headquarters required a large staff, both administrative and technical and as neither the R.I.N. nor commercial sources could provide a sufficient number, the majority of the technical staff had to be found by the Admiralty and the Ministry of War Transport. Owing to the shortage of such personnel, however, it was not until 1943-44 that even all the most important posts could be filled and many requirements were still outstanding at the termination of the war. On the naval side, outside the port of Bombay and a little later Calcutta, D.G.S.R. could only be represented by the Naval Officer in charge at each port and technical supervision was exercised through the different Base Engineer Officers. This lack of balance between the construction, engineering and electrical engineering sides was not rectified until early 1945 when the Admiralty were able to provide a limited number of overseers.

Similarly on the merchant ship repair side supervision was at first limited to Bombay, Calcutta and Karachi and for the first year or so the number of overseers available was insufficient even at these ports; later adequate representation was obtained as a result of a visit to U.K. by D.M.S.R. in February 1945. Of all D.G.S.R. activities, the one which suffered the greatest from lack of staff was shipbuilding. At no time were adequate numbers available for planning, supervising, inspection and distribution of special fittings.

The staff as finally composed consisted of officers of the Royal Navy, R.N.R., R.N.V.R., R.I.N. and R.I.N.V.R., Military Officers, seconded officers of the Indian Civil Service, Technical personnel from the U.K., India, Malaya, Hong-kong, and clerical staff drawn mostly from India.

The strength of the D.G.S.R. organisation at its maximum (end of 1944) was:—

Gazetted	121
Ministerial and other staff	474
Inferior servants	164

The following figures will give an idea of the D.G.S.R. activities:—

Craft of all type constructed	3,970
Men of War of all types and nationalities Repaired (January 1944 to August 45 inclusive)	1,857
Merchant vessels of all types and nationalities repaired (January 43 to August, 1945)	7,261

CHAPTER XV

COTTON TEXTILES DIRECTORATE AND ITS TRANSFER TO INDUSTRIES AND CIVIL SUPPLIES DEPARTMENT

When the Department was re-organised in April 1940, into a Secretariat and six Directorates, Textile was one of them and dealt with cotton, jute, etc. Before the war, there were not a few Indian cotton mills which had experience in supplying materials peculiar to the needs of the army, and when war broke out, it was possible quickly to step up production to meet the first urgent demands. With few exceptions there was little difficulty during the first 18 months of the war in meeting the demands made on the industry, although these were becoming increasingly heavy. There was, however, one difficulty in that the army authorities continued the system, successfully followed in peacetimes, of placing demands as and when the need arose, or could be foreseen. As demands increased in numbers and in volume, the need became apparent for old methods to be abandoned and new ones to be introduced, and, at the request of the Supply Department, the Defence Department drew up a long-term forward programme so that arrangements for future could be carefully planned. About this time the E.G.S.C. started to function, and placed for supply from India heavy demands for equipment and clothing for the use of the forces in the Dominions and with overseas commands.

Prior to this stage, purchases had been made by the normal peacetime method of tender. Demands were comparatively small, imports of cotton cloth from Japan and elsewhere into India had not yet been greatly affected, and Empire countries in this hemisphere were continuing to receive supplies for civilian use from sources other than India. For Government purchases the tender system produced reasonably satisfactory results.

During the earlier part of 1941, this situation gradually changed and, coincidentally with large increases in demands for the Defence Services of India and E.G. countries, there was a curtailment of supplies to these countries and India for civilian use, from Japan and other sources, creating a substantial demand on the Indian industry for export. This demand was greatly increased when Japanese assets were frozen and trade between India and other Empire countries and Japan came virtually to a standstill.

As the result of these developments prices in Indian markets began to rise sharply, and the tender system, which was not designed for purchases under such conditions, showed the defects inherent in it. Contracts were concluded after negotiations with individual mills. While this was immediately helpful, it was evident that it was a method which, if not impracticable, was likely to be ineffective and cumbersome if continued for a long period, for securing large supplies. Joint negotiations with the accredited representatives of the industry provided the obvious solution and a Conference of millowners was held in Bombay on September 8 and 9, 1941. In this Conference it was decided that a panel consisting of members drawn from various centres of the cotton textile industry and representing a cross section of all interests should be created to advise and negotiate with Government on behalf of the industry as a whole, both in British India and the Indian States. The first meeting of this Panel was held in Bombay in October 1941, under the Chairmanship of the Supply Member.

Transfer of Cotton Textiles Section of the Textiles Directorate to Bombay and formation of a separate Cotton Textiles Dte.—After this Conference it was decided that the Cotton Textiles Section of the Textiles Directorate (D.G.S.) should move to Bombay so as to be in close and continued touch with

industry and its leading representatives, and that a separate Directorate of the D.G.S. to be known as Cotton Textiles Dte. should be formed with headquarters at Bombay. The Directorate began to function in October 1941, and began to deal with the planning and purchase of entire cotton textiles requirements. Sir Frederick Stones was appointed Honorary Technical Adviser to examine the whole situation, particularly in respect of prices with the help and advice of various individual members of the Panel.

Organisation as it stood about October 1942.—The organisation of the Cotton Textiles Directorate, about October 1942 was as follows:—The post of the A.D.G. was upgraded to that of the D.D.G. (TX). It had two main Branches (Planning and Purchase). Under Planning, there were Administration, Statistical, Planning (proper), Millstores, Machinery and Chemicals and Technical Sections. Purchase also had different Sections and was under a Controller of Purchase. There were several sub-committees. Government provided every possible assistance to the industry not only to ensure its essential supplies of raw materials, stores, dyes, chemicals, coal etc., but also to provide technical assistance to those with little or no previous experience in the manufacture of Government materials to the exacting standards demanded by the Defence authorities. This function was performed by the Millstores, Machinery and Chemicals Section under the direction and control of Mr. J. B. now Sir John, Greaves who was appointed as an Honorary Adviser. Owing to circumstances beyond the control of the Directorate, and in some cases of the Government of India itself (for example, export restrictions from the United Kingdom and other countries on mill stores and machinery) this Section had to take over the responsibilities of control etc., of various articles and commodities. As, however, it was the earnest desire of Government that control should not be irksome or productive of serious delays and should be worked in a thoroughly realistic and practical manner, a Priority Assistance Advisory Panel was established to assist and advise this Section. Its members comprised representatives of the mill industry, millstores, importers and indigenous millstores manufacturers, who sat under the Chairmanship of Mr. Greaves, the Honorary Adviser, with Sir Frederick Stones, and another Government representative. By this means complete and close co-operation of all interests was secured.

The Planning Section under the control of a Director provided the direct contact with the Panel and its Sub-Committees at meetings held from time to time, at which representatives of the Government of India were present so that all decisions automatically received Government approval. Purchase Sections were the machine for the issue of the actual contracts.

Like all other units, a Finance Department officer was also attached to this Directorate. Closely associated with the CX Directorate were the Inspectorate of Textiles and the Inspection Branch. The former, under the direction of an Inspector, was a Branch of the Defence Department organisation which was responsible for standards of all stores for supply to the Services. When the Directorate moved to Bombay, the Cawnpore Inspectorate of the Defence Department also moved that part of their organisation which handled cotton textiles. A completely equipped laboratory for tests of every kind of cotton fabrics, yarns, sewing threads, etc., was established in Bombay, and the staff maintained close contact with the Cotton Textiles Directorate. The Inspection Branch under a Controller of Inspection was responsible for the inspection of bulk supplies. Both these organisations were under the control of C.G.I.

The Defence Department established a Standing Committee on Specifications (Cotton Textiles) under the Chairmanship of Sir Frederick Stones, the Honorary Technical Adviser to Government to ensure that specifications should, having regard to the purposes for which material was required, be drawn up so as to make the best possible use of the country's manufacturing potentialities

and also within the limits imposed by the essential requirements of the Services, to utilise India's cotton crop to the best possible advantage.

Besides, there was a Cotton Movements Panel which was constituted in September 1942. This Panel advised Government on every aspect of Cotton Supply and transport problems as they affected growers, merchants, consumers, exporters and the Railways. It may also be mentioned that various Control Orders had to be issued, *e.g.*, The Cotton Card Clothing and all Card Clothing Sundries Control Order, 1942, the Healds and Reeds Control Order, 1942, the Cotton Textiles Sizing and Filling Control Order, 1942, the Shuttles Control Order, 1942, the Bobbins Control Order, 1943, the Starch Control Order, 1943, and were administered by the Cotton Textiles Directorate.

Thus the system of securing war supplies from Government by the co-operative effect of the accredited representatives of the industry and the executive organisation of Government represented by the Cotton Textiles Directorate and the Defence Authorities represented by the Controller General of Inspection and his organisations passed its experimental stage. The system provided an outstanding and unqualified success and the results obtained a triumph for goodwill and commonsense. What might in other circumstances have proved intractable problems had readily been solved.

Transfer to the Industries and Civil Supplies Department.—The Department of Industries and Civil Supplies was created in April 1943, and as the major part of the Cotton Textiles Industry meets the civilian needs of the country, it was decided to transfer the Cotton Textiles Organisation *en bloc* to the new Department. The transfer took effect from the 15th May, 1943. The Organisation up to that time continued as outlined above. A list of items that became the responsibility of the new Department was published for the information of the indentors. The Department of Industries and Civil Supplies made many changes in the organisation, for instance, appointment of a Textiles Commissioner, etc., but this study is not concerned with the work of that Department.

CHAPTER XVI

FOODSTUFFS DIRECTORATES—CREATION, WORK AND TRANSFER TO THE FOOD DEPARTMENT

In peace-time the Contracts Directorate catered for the food requirements of the Army. The Director of Contracts controlled and administered the Grain Depots, Controlled Flour Mills and Ghi Heating Centres. When the Contracts Directorate was amalgamated with the Supply Department in December 1939, the responsibility for foodstuffs fell on that Department. The administration of the Controlled Flour Mills, the Military Grain Crushing Depots and the Ghi Heating Centre, however, continued with the Director of Contracts who was responsible to Q. M. G. in these matters. The Supply Department arranged for the supplies of food and forage items through the Contracts Directorate.

As regards foodstuffs, the war problem divided itself into three parts:

- (a) The foodstuffs for these troops who must continue to eat in war what they ate in peace. This represented no increase of requirements but that a given number of mouths had to be filled in another geographical location (*e.g.*, troops with staple diets, rice wheat, millet, maize, etc.).
- (b) The exploitation of local resources for foodstuffs in and near the theatre of war. The problem primarily concerned fresh meat and fresh vegetables. If former was not expandable, more attention had to be paid to the development of fresh vegetables growing as the war progressed.
- (c) The balance of commodities of preserved foodstuffs such as fish, fruit, and vegetable groups.

Difficulties began to be felt especially in regard to items like ghee. Normal peace-time requirements were about 2,000 tons but the demand increased to about 30,000. New sources had to be found. The Director of Contracts suggested that the D. G. S. should take over the responsibility for foodstuffs and also the operation of Controlled Flour Mills, Grain Crushing Depots and the Ghi Heating Centre. Tinned foodstuffs for the troops in Mid-East were supplied by the U. K. in general. Defence Forces in India consumed fresh rations and tinned foodstuffs consumption was limited to a reserve to meet for the requirements of troops sent to Overseas and N. W. F. P. Indian demands were thus very insignificant compared to the heavy demands of the Mid-East. The E. G. S. C. focussed attention on Mid-East requirements and H. M. G. desired that E. G. countries should meet foodstuffs requirements for Mid-east as far as possible. India could only cater for vegetable and fruit groups. It was estimated that India could supply large quantities of tinned vegetables, about 10,000 tons, tinned fruits, etc., about 15,000 tons of dry fruits and 10,000 tons of jam, etc. Steps, to secure promise of certain orders contingent on price and standard and educate capable firms up to requisite standard and commence supplies to Mid-east of these items, were taken. It, therefore, became essential to create a nucleus organisation and a foodstuffs Directorate was created in December, 1940 to take over the tinned food, vegetables, etc., and to do the planning for certain centrally purchased supplies for which early action appeared necessary. In agreement with the various authorities concerned like Q. M. G., it was decided that the first stage of the development should be focussed on securing the supplies of tinned fish, fruits, jam, cheese, milk, butter and preserved vegetables.

Generally speaking, the rationing of Indian troops both in India and overseas from supplies procurable in India presented no problem, but difficulties were encountered in providing preserved foodstuffs from Indian sources required by British troops. India maintained certain preserved foodstuffs for her own Defence Forces. Gradually, about 50 firms sprang up within a year and were engaged on preservation of foodstuffs either by canning or by bottling. Standards were laid down by the Military Food Laboratory, Kasauli. Many steps were taken to encourage and assist indigenous manufacturers to improve their quality up to the standard acceptable to the Defence Authorities. It was the responsibility of the D. G. S. to attend to this development. Exploratory and preparatory work had already been done.

Splitting of Foodstuffs Directorate into three separate Directorates.—The work of the Directorate kept on increasing, necessitating expansion and by the end of November 1942, three Directors were dealing with different items. Soon after, it was felt that it would conduce to efficiency if the three Directors were made independent of each other and the Foodstuffs Directorate was split up into three separate Directorates as:—

- (1) Directorate of Processed Foodstuffs (Development) (short title—Director, Development).
- (2) Directorate of Agricultural and Dairy Produce (short title—Director of Agriculture).
- (3) Directorate of Foodstuffs Supplies (short title—Director of Foodstuffs).

The Directorate of Processed Foodstuffs was made responsible for such items as essence, fish (dried), malt, pickles, rolled oats turmeric, vegetables, vinegar, tomatoes, etc., and the following items for development purposes, *e.g.*, fruits, ginger, jam, mearani, margarine, vegetables (tinned), etc. The Directorate of Agricultural & Dairy Produce dealt with such items as coffee, coriander seeds, dhalls (urd-chenna, moong, masur, arhur), flour, ghee, grains (gram barley oats, maize, etc.), mustard, oilcakes, rice, sago and tapioca, wheat, development of hops, production of potatoes, production of vegetables, dairy produce, etc. The Foodstuffs Directorate dealt with corn flour, curry powder, cream tinned, dripping & lard, essence (lemon, vanilla), fish (tinned), foods fruits (tinned), gelatine sheet (edible), ginger (Non-processed), golden syrup, ham (tinned) hops, jam, jelly, lard and lard components, macaroni, meat extracts, oil cooking, pepper, rum, salt, sausages (tinned), tea, tongue (tinned), vegetables (tinned), wines and spirits (brandy burgundy, champagne, port, sherry, whisky) etc.

At this time it was considered desirable to make a distinct cleavage between the technical aspects of developing additional foodstuffs supplies and the normal work of procuring supplies from established sources. Or in other words it was desired to introduce a post that was parallel in the D. G. M. P. to that of the Chief Metallurgist. A post of Chief Technical Officer (Foodstuffs Development) was, therefore, created on 11th December 1942 and graded as an A. D. G. to carry out the following duties:—

- (1) **Indent stage.**—A copy of all foodstuffs indents for his information, no orders for overseas supplies without his consultation and his advice as to the sources to be sought for.
- (2) **Development work.**—Incharge of all Industrial Planning Officers, responsible for all original development work up to the stage of the new production being put into mass production, development of correct processing, etc.
- (3) Technical matters.
- (4) Inspections and rejections.
- (5) Specifications.
- (6) Trial production; and
- (7) Examination of samples.

When he had produced an acceptable article, it would be for the Director of Processed Foodstuffs to undertake the execution action to bring the projects to fruition. In short, the whole plan was to separate development from the procurement of supplies and to make the Chief Technical Officer responsible for development and the Directors for procurement; normally each Director being responsible for the development of new projects.

Transfer of the Foodstuffs Directorate to the Food Department.—In the meantime, owing to the general scarcity of food items throughout the country, it was decided to create a new Department of Food and make it responsible for civil and military requirements. The Foodstuffs Directorates, therefore, with the respective staff (Planning and Purchase) were transferred to the newly created Food Department with effect from 1st January, 1943.

CHAPTER XVII

PROGRESSING ORGANISATION IN THE SUPPLY DEPARTMENT

The idea of a progressing system is to eliminate delays occurring from the date of receipt of an indent to the completion of deliveries. All demands pass through two stages—

Stage I.—From the date of receipt of an indent to the date of issue of an acceptance note to a contractor.

Stage II.—From the date of issue of the acceptance note to the completion of deliveries.

The progressing arrangements prescribed for the Directorate General of Munitions Production (less Armaments Production Division), the Directorate General of Supply, and the office of the Director General, Indian Medical Service, about August 1942 were broadly as follows:—

Stage I.

- (a) All indents were received in a Central Section equipped with a statistical cell. Here Hollerith cards were opened, and after the basic particulars had been punched, the indents (other than non-war indents which went straight to the Purchase Branch) were distributed to the Directorates.
- (b) The Directors in consultation with Purchase settled how each indent was to be handled. Some indents needed only "straight" purchase action; others needed technical planning or negotiations with industry.
- (c) After decision (b), each indent was passed to the appropriate Purchase Section or to a Controller of Supplies for purchase action.
- (d) Directors were given a fortnightly control statement showing all indents not passed for Purchase action and were expected to chase up the causes of delay.
- (d) After an indent had been passed for purchase action, its subsequent history was recorded in the statistical cell attached to the Purchase Section, or in the case of indents sent to the Controllers of Supplies in a special statistical cell.

Stage II.—At headquarters the history of each indent was continued on the Hollerith cards in the statistical cells attached to Purchase Sections. Control statements of delays were submitted; registers were also maintained for progress on each indent, and for each contractor and for each individual supply item.

In the factories, active progressing was done for the Civil Armaments Production Division by the Industrial Planning Staff working at Calcutta and under the Controllers of Supplies elsewhere. Various Directorates of the Directorate General of Supply, and the Director General, Indian Medical Service, had small outdoor staffs. The Controllers of Supplies were expected to assist, and valuable assistance was also received from the Military Inspectorate. But the arrangements for active progressing in the factories were neither uniform nor adequate. Several Directorates such as Clothing, Timber and Vehicles followed control methods of their own.

Apart from the important deviations referred to above, there were defects inherent in the prescribed arrangements which were:—

- (1) The Hollerith system requires a very high standard of office discipline. The machines tabulate only what is put into them, and regular supply of accurate information from the machine depends upon a

regular flow of all documents including acceptance and inspection notes. The system is admittedly difficult to work efficiently.

- (2) The Hollerith system demands of officers a close study of instructions which are complicated and the digestion of statements originally tabulated in part at least in code.
- (3) The system provided for submission of control statements which could be used as the basis of progressing, responsibility being with the Directorates so long as the indent was with them and thereafter it passed to the Purchase Section.
- (4) Neither at Stage I nor at Stage II was there adequate provision for the active elimination of delays.
- (5) At Stage II excepting the Industrial Planning Staff working for Civil Armaments Production Division, the staff employed on outdoor duties was inadequate.
- (6) The Controller of Supplies acted either as agents for the Directorates General, or in a certain number of cases as independent planning and purchasing units. Their own internal progressing arrangements too were rudimentary and required immediate overhaul.

There are two methods of progressing:—

- (a) the passive method which involves the scrutiny of statistical returns and narrative reports with the object of detecting delays and removing their causes, and
- (b) the active method which involves constant contact with manufacturers with the object of foreseeing and removing obstacles to punctual deliveries.

The Armaments Production Division which administered the Ordnance Factories had a competent progressing section working in close touch with the Factory Superintendents and employed both methods. The progressing of the production of munitions components was also satisfactory. They had the Industrial Planning Staff and followed both the methods. In the Directorate General of Supply each Director had a compact and self-contained charge and did his own progressing. Up to October, 1942, reliance was placed on inspection reports and no active method of progressing orders was employed. Attempts were made to improve progressing by passive methods and an Officer on Special Duty with long experience of mechanical statistics was employed for several months in getting the Statistical System on its legs. This system was used to throw up for the information of Directorates the cases in which delays were occurring. But the time lag in the receipt of the primary documents and the enormous number of orders under execution at any given time made it impossible to use the passive method as a real means of control.

It was, therefore, felt that the real remedy was to employ a special organisation for active progressing in the factories themselves. Thus it was felt that two measures were necessary—

- (i) to ensure the efficiency of the arrangements at headquarters; and
- (ii) to provide adequate arrangements in the offices of Controllers of Supplies, and adequate outdoor staffs.

Necessary action was taken in the Directorates General of Munitions Production and Supply and in the office of the Director General, Indian Medical Service. Where the association of Directorates with Purchase Sections was incomplete, re-organisation was effected. Punctual transmission of relevant documents to the Statistical Cells began to be insisted upon. It was impressed upon the officers that full advantage should be taken of the Control Statements thrown up by Hollerith and that the primary responsibility for Headquarters progressing at both the stages would rest on the Directorates. A Chief Progress Officer was

appointed to take charge of the headquarters progressing in the Directorate General of Supply while the D. G. M. P. had already a Director of Progressing. Posts of Progress Officers for Directorates Circle Progress Officer and Assistant Progress Officers were sanctioned. The Circle Progress Officers were located with Controllers of Supplies at their headquarters. Assistant Progress Officers were distributed according to the work in each circle. In the Directorate General, Munitions Production, Progress Representatives were appointed in various circles and Progress Assistants at Headquarters.

The Chief Progress Officer (or the Director of Progress in the Directorate General, Munitions Production) was made responsible for the efficient working of the entire progressing system. He ensured that Planning Directorates or Sections and their associated Purchase Branches furnished the material required for the proper working of the statistical system. He was also responsible for the co-ordination and other central functions. He also ensured that control statements and returns furnished by Hollerith were properly scrutinised and dealt with, that all orders were actively progressed through Stage I and Stage II by Progress Officers and Assistants. The Progress Officers or Senior Progress Assistants were located in Planning Directorates or Sections. The basic unit was the progress cell in the Planning Directorate or Section, and the basic responsibility for progressing rested on the Directorates.

The Progress Officers and Senior Progress Assistants at headquarters working in Directorates furnished the material required for the proper working of the statistical system, scrutinised, and reported to their respective Directors or Section Officers on the control statements and returns received from the statistical system, actively progressed through Stages I and II, all orders received in their Directorates or Sections, reported on actual and apprehended supply failures to the Chief Progress Officer and ensured that indentors were informed by the Directorates of serious delays or actual or apprehended supply failures.

The Circle organisation consisted of Circle Progress Officers and Assistant Progress Officers and Progress Representatives. The Officers were on the staff of the Circle Offices under the control of the Officer-in-Charge of the Circle. They progressed their own and Headquarters orders.

Headquarters issued instructions as to which orders were to be actively progressed. The field workers chased the contractors and reported any bottlenecks that arose in the execution of orders, tried to remove them.

The Organisation started functioning about February 1943 and achieved very good results. All orders covering War and Railway indents placed by the Director General, Munitions Production, or placed by Controllers of Supplies on a cross-mandate from Director General, Munitions Production were progressed. As regards the Directorate General, Supply, only selected contracts covering indents were progressed actively in the field in order to foresee and remove obstacles to punctual delivery. The Progress Officers at headquarters watched and prepared statistics of the indents on which no action had been taken in the Directorates and brought these to the notice of the respective Directors. The result was that delays which formerly occurred were considerably reduced and indents no longer lay in the Directorates. In short the purpose of progressing system which was to ensure—

- (a) that intelligent studies were made of supply prospects and results for purposes of administrative control;
- (b) that delays were eliminated in the execution of individual orders placed on the Supply Department; and
- (c) that indentors were informed in good time of probable or actual supply failures

was achieved through the Progressing Organisation.

CHAPTER XVIII

SHIPPING ORGANIZATION IN THE SUPPLY DEPARTMENT

As mentioned before, Provincial Organisations were established in the various provinces upto the middle of 1940. The Controllers at the major ports of Calcutta, Bombay, Karachi and Madras also functioned as Shipping Officers. They handled imports of the D. G. S. items and other items for which there were no separate contracts, and also dealt with diverted and frustrated cargoes. Similarly, these Controllers of Supplies, especially at Bombay and Madras, had to handle export of fair volumes of cargo consisting mainly of cotton piece-goods, yarn, etc., at Bombay, and of textile and other supplies to E. G. countries, such as Australia, South Africa, New Zealand, Ceylon, etc., at Madras. The Embarkation Commandants at ports were mainly concerned in clearing and despatching cargoes for civil departments including the Supply Department. Similarly, the Steel Import Controller arranged his clearances through the agency of Messrs. Cox & Kings under an independent contract with the firm. The controlling officers in the D. G. M. P. had also separate clearing arrangements under contracts subsisting with various commercial firms which did clearance of their items. On the side of supplying information to controlling officers, the A. P. Branch in the Main Secretariat had contact with its Deputy Chief Accounts Officers at Bombay, Karachi and Calcutta who were mainly "listing" officers, i.e., officers responsible for making lists of items of stores as they arrived in each port and as they were despatched. Although, these officers were not concerned with the clearance of stores as such, but mainly with the preparation of lists of articles imported for purposes of accounts, they began to maintain close liaison with the Embarkation Commandants and thus came into close contact with matters relating, generally, to clearances. The A. P. Section became more and more involved in this question in the Main Secretariat as the Lease/Lend imports grew and took over the work from other branches.

About the end of 1942, difficulty in quick handling of cargoes began to be experienced at ports, initially in Bombay, due to lack of quick and correct despatch instructions. To avoid congestion of goods in several Indian Ports and to give quick turn-round to vessels (which were also getting to be a scarce commodity owing to war circumstances), it was also essential for every consignee interest to arrange earliest clearance of its cargoes from the dock areas. The consignees had their own difficulties as they were dealing with commodities in acute short supply and had to decide upon their best use only after receipt of information regarding their expected arrival—and this was not always quick in forthcoming—but these difficulties were outweighed by the urgent requirements of full use of ports and quick return of vessels. The necessity, therefore, arose for providing and controlling transit holding depots in ports and keeping goods which must be moved from docks but which were not yet ready for immediate despatch. The principal question, however, was of determining the correct representatives at ports for arranging quick clearance and (to put the first thing second) of co-ordinating the issue of correct and timely instructions to these officers about internal despatch or disposal of goods. The several controlling officers of the Supply Department who were the original indentors and the end-users of goods in categories under them had for this purpose to let the port representatives know about the expected arrival of goods, as well as their internal destination and to co-ordinate this, Shipping Officers were appointed in various Directorates General.

There were Shipping Sections in the Directorates General as also in the office of the Controllers of Supplies at ports, but the Centre was without a Shipping Officer, who could do the work of co-ordinating all shipping information received through the Q. M. G. and maintaining a complete liaison with authorities in India

and outside, such as the War Transport Department, the M. W. T. Representative, the Secretary of State for India in London, the D. G., I. S. D., Blackpool, the E. G. Countries and—what was tending to become a very important exporting agency—the I. S. M. in America. It was considered that it would be the function of such Central Officer to obtain all information covering expected goods and to distribute it to the authorities concerned directly or otherwise with their receipt at ports and internal despatch. A proper co-ordinating agency was required to obtain quick and clear disposal instructions from the controlling officers in the Directorates General on the one hand and a set of officers at the main ports was necessary on the other hand not only to deal effectively with these instructions but to keep an eye on incoming cargoes and to trace arrivals to the indentors with a view to obtain such instructions. All these factors led to centralising the policy control and co-ordinating the procedure mainly with the object of quick and efficient handling of goods. This policy took effect from 1st April 1943.

The above orders were mainly designed to simplify and standardise the arrangements for (1) the reception and distribution of goods shipped to the Supply Department from overseas; (2) the despatch by the Supply Department of goods to overseas indentors. The Shipping Organisation became primarily responsible for handling of all goods ordered by or consigned to the Supply Department and for the despatch overseas of goods procured on direct orders from overseas indentors, or on allocation from E. G. S. C. requiring delivery overseas. Certain indentors such as oil companies were allowed to handle their own imports, although the responsibility for recording transactions of arrivals and clearances was fixed on the Circle Shipping Officers.

The Shipping Officers were, mainly, expected to collect from controlling officers and register particulars of orders placed overseas. They also received from the Main Sectt., Q. M. G.'s Branch and Controllers of Supplies, all information about shipments from overseas and communicated relevant information to controlling officers. The Director of Factory Expansion and the Steel Import Controller in Calcutta, as well as the exports of timber from the Timber Depots were excluded from this arrangement, the former with a view not to disturb their existing method of progressing orders and the latter because they had already their own elaborate routine. They also collected from the Controlling Officers and transmitted to the Circle Shipping Officers instructions regarding reception and distribution of incoming and despatch of outgoing goods.

Circle Shipping Officers were also appointed at Madras, Bombay and Karachi under the Controllers of Supplies, and were to be the port representatives of the Supply Department. The officers at Madras and Bombay were made responsible respectively for Vizagapatam and Cochin and the latter for the Kathiawar ports. At Calcutta, the duties of the Circle Shipping Officer were to be entrusted to a separate officer so designated under the Controller of Supplies, Bengal, except that the Shipping Officer in the D. G. M. P. was to be the Circle Shipping Officer for goods controlled by his Director-General. The responsibility for policy control and co-ordination rested with the Main Secretariat and specifically with the Joint Secretary (American Purchases). This latter authority was responsible for all shipping transactions and for the efficient working of the new arrangements with the prime object of quick and efficient handling of goods. To enable him to fulfil this most important function, his staff was strengthened by a Chief Shipping Officer, to provide proper executive direction. As the inevitable break from the Embarkation Authorities came, the department had to decide upon its own clearance and despatch arrangements for which provision for employment of professional clearing agents was made, although it was definitely stipulated that no absolute monopoly to any clearing agent was contemplated.

By all the above arrangements, a link was established between the Shipping Officers in the Directorates General and the Circle Shipping Officers, and also between the Embarkation Authorities and the Circle Shipping Officers. The

Circle Shipping Officers made direct references to the Chief Shipping Officer and *vice versa* on all shipping matters in the interest of speedy and efficient handling of cargoes. The Steel Import Controller also began to fit into the shipping chain. In the nucleus at the Centre was subsequently added a Deputy Chief Shipping Officer.

The anomalous position providing for Controllers of Supplies responsibility for port organisations, however, continued on paper till actually the end of 1944, when the Circle Shipping Officers appropriately re-designated as Port Shipping Officers came directly under the administrative control of the Chief Shipping Officer, with their distinct staffs, as from the 1st January, 1945. The Port Shipping Officers were authorised to exercise the powers of a "Head of Office". Through all these arrangements, for the first time a complete central control was established in the Main Secretariat under the Chief Shipping Officer.

Working of the Shipping Organisation.—Broadly speaking, the main functions were two: (a) Quick clearance of cargoes, especially L/L cargoes (which represented a large percentage of imports), with a view to their earliest end-use by the controlling officers who indented them; and (b) proper accounting of all cargoes consigned to or ordered by the Department. The first function of quick clearance was physically to be performed by the Circle Shipping Officers with the assistance of the clearing agents. The Chief Shipping Officer maintained a close liaison with the Movements Directorate of the Q. M. G.'s Branch Directorate, which controlled all shipping at Indian Ports during war and represented the Supply Department on the Indian Shipping Diversion Committee a very important limb of this Directorate. He also obtained from the Movements Directorate all particulars of expected cargoes through copies of sailing cables, ships manifests and further advance information through vessels loading positions at the shipping end and passed on such information to the Shipping Officers.

The Port Shipping Officers, however, could not always wait for the above information from the centre or from the Shipping Officers, and they were called upon not infrequently to take initiative when a vessel arrived into the port, so to say without warning and had cargo on board for the Supply Department. It then became the duty of the Port Shipping Officer to check up items concerning this Department from the ship's manifest (Master's copy to be obtained through the Embarkation Commandant) or even from marks on the packages themselves and, wherever he was in doubt about the ultimate destination, to contact the Shipping Officer concerned for the issue of relative disposal instructions to ensure proper despatch. The Port Shipping Officers maintained a very close liaison with the Embarkation Commandant, the Steamer Agents, the Port and the Customs authorities.

The office of the Chief Shipping Officer was also a clearing house in India for all bills of lading, invoices and packing lists received from the India Supply Mission. This set of documents came through to India via R. A. F. Transport Command in packages which were collected by the Port Shipping Officer at Karachi and forwarded immediately under telegraphic advice to the Main Secretariat by a fast passenger train. These documents were then sorted, listed and despatched to the interests concerned. These were really the final documents to connect up details of goods (also for accounting purposes) and formed the ultimate basis of prices to be recovered from the paying indentors; they had, therefore, to be placed in the hands of the controlling officers as quickly as possible. The Main Secretariat was thus the co-ordinating link also for types and particulars of cargo for receipt by Supply Department.

The function of quick handlings of goods had also an important export side. It generally covered two aspects. The first aspect related to re-exports of imports or sending of goods, discharged for reasons such as convenience of the vessel congestion at destination, to their proper port destination. Occasionally the handling position at the wharves or moorings of a destination port continued to be

difficult, in which case the internal transport was arranged by rail for such off-loaded goods. The Port Shipping Officers were just as for the internal despatches of goods, called upon to maintain a close liaison with the Priority authorities of the Railway Administration and for exports by sea with the local representatives of the M. W. T. and the Controller of Indian Shipping. The second aspect covered exports and divided itself into coastal and overseas exports. There was an elaborate procedure laid down for coastal export.

The second function of the Shipping Organisation was the maintenance of accounts. They covered the imports of (i) L/L and other stores received from America on indents placed through the Supply Department here and (ii) against orders placed on H. M. G. mainly for war stores, but diverted by them to the United States, also (iii) of Supply Department stores from other countries. The Shipping Organisation was also concerned with maintaining records of receipt and disposals and obtaining consignees receipts for stores ordered by or consigned to the War Department and cleared by the Embarkation Commandants of kindred organisations of that Department. The Port Accounts Officers were merged in the offices of the Circle Shipping Offices towards the end of 1943, after which the Shipping Organisation was required to maintain suitable registers and made fully responsible for accounting of all imports from America.

The procedure at the ports covered maintenance of registers of all cargo from the U. S. A., whether L/L or non-L/L, from Canada, whether on mutual aid or on cash and from other countries. The Port Officers prepared port compilation returns for submission to the C. A. O. (A.P.) on the basis of actual arrivals within a stated time to enable this authority to link them up with shipment advices.

The Organisation was continuously dealing both at the centre and at Ports with documents relating to goods imported for war purposes and covering movements of vessels and, therefore, with matter highly secret. The physical job was handled by Messrs. Cox and Kings Limited, who were appointed as clearing agents for all Supply Department cargoes to be handled at the leading Indian Ports of Calcutta, Bombay and Karachi while Messrs. Parry & Co., worked on their behalf at the ports of Madras, Vizagapatam and Cochin. The firm's representative took instructions from the Port Shipping Officers and the firm was made responsible for tallying of all cargoes from the wharf-side upto their despatch direct or ex-transit depots. The ports of Coconada, Cuddalore, Calicut and Tuticorin were also included in the clearing arrangements.

Apart from the functions narrated above, the Port Shipping Officers also arranged for transit depots and provided road transport from the dock areas to these depots and crane facilities at the depots. Certain items presented peculiar problems. Steel formed the principal item comprising bolts, nuts, drumsheets, plates, billets, pipes and tubes, strip steel, wire rope, tinplates, angles and railway material. Sometimes the plates were over 24' in length for which the Railway bogey wagons were not easily available. In such cases they were taken to the transit depots, sorted out and carried by the tank transporters to their local destination.

CHAPTER XIX

STATISTICAL ORGANISATION IN THE DEPARTMENT OF SUPPLY

In April, 1940, when the Department was re-organised into a Secretariat and six Directorates, the Statistical Directorate was responsible for the preparation of departmental progress reports, recording of important departmental meetings and the co-ordination of departmental statistics. The Contracts Directorate and the Indian Stores Department maintained certain statistical records for the compilation of their annual reports but the five Planning Directorates which had been created on the 1st April, 1940, had no settled methods. For the first several months of the war, statistics were more or less maintained on a manual basis.

A proposal to substitute mechanical methods for manual methods was mooted in the summer of 1940 and was finally approved in November 1940 after considerable controversy. Statistical Sections equipped with Hollerith Machines were created in the two Directorates General. Necessary staff and machines (key punches) verifiers, reproducing punches, etc., were arranged. The initial objectives were comparatively simple and involved the recording of individual orders at the various stages from indents to final payment. In Calcutta, subsidiary objectives were introduced in connection with control of orders for steel, the progress of indents, and largely owing to the success with which the subsidiary statistics were handled, Calcutta was more successful than New Delhi in the whole statistical field.

Though the Hollerith System was introduced throughout the Department, owing to a failure to establish the necessary routine much of the basic materials did not reach the machines. There were other defects, such as the system did not provide for the Ordnance Factories, whose statistical methods were well established and for the independent activities of the Director General, Indian Medical Service, and the Controllers of Supplies. When the decision to use the Hollerith System was taken, the general idea was that if a fairly comprehensive card was punched, statistical information could be obtained as and when required. This idea was found to be wrong as cards accumulated very rapidly and full use could not be made of resultant statistics unless there were routine statements supplemented by special statements when necessary. Statistics then remained embedded in the cards.

Normally the manual method actually in force in a Department is studied and cards and statements designed to give whatever information is required. In the Supply Department cards had to be designed more or less on first principles and it was not clear that the record and control statements which were in use gave the required information. Hollerith should be told what is really wanted. Then only the results can be obtained. The primary documents coming forward contained errors. It was felt that months must elapse before Hollerith would be in a position to give the full measure of help. The requirements were (a) record system and (b) a control system.

For several months, attempts were made to get things straightened and in particular to standardise a system of control of the progress of indents, but to no avail. It was felt that radical changes were needed. Mr. Chastell, Head of the British Tabulating Machine Company in Asia offered to work in an honorary capacity to bring the statistical system on to a sound footing. He started work in July 1941. He was asked to examine the existing routine in each Directorate or Section to ascertain what statistical records were being maintained and for what purpose. He was also to lay down a routine and draw up a detailed plan for the same with a view to improve the methods then in force.

Mr. Chastell's conclusions were:—

- (a) that the objectives had not been sufficiently well-defined;
- (b) that the organisation needed tightening up;
- (c) that the basic material was not reaching the machines owing to the unsatisfactory character of the routine; and
- (d) that certain additional equipment was required.

It was, therefore, considered that the objectives should be properly fixed and instructions were issued to see that a regular routine which would result in a steady flow of the basic material was established. It was decided that a special officer of Secretariat rank should be placed in charge of the statistical Sections for some time. Mr. K. R. K. Menon, C.I.E., O.B.E., Commissioner of Income tax, Madras, was, therefore, appointed as O.S.D. to—

- (a) examine the existing statistical system and the orders on which it was based;
- (b) decide what periodical returns were required for purposes of record, control and post-war reconstruction;
- (c) establish the working routine necessary to the compilation of the statistics required;
- (d) issue all necessary orders for the operation of the system; and
- (e) make such recommendations as he thought fit for staff re-organisation or charges.

He was made responsible for all statistics in the Department, whether mechanically or manually tabulated, and the Director, Statistics was left with records such as the weekly progress report, reports of meeting, etc. Later the post of Director of Statistics was abolished from the 1st February, 1942 and redesignated as Chief Statistical Officer but the ex-officio status of the Deputy Secretary to the Government of India was allowed to remain. He was placed in charge of the entire Statistical System in the Department as well as the Record Branch in the Main Secretariat.

Mr. Menon submitted a detailed report making suggestions for re-organisation of the entire statistical machinery for the various branches of the Department and the new procedure was adopted from 1st January 1942. On this date the statistical work was divided between the "Manual" statistical sections and the central "Mechanical" section. The work done by the latter after the commencement of the re-organisation may be grouped under the following two broad categories:

- I. Reports and returns prepared only by a mechanical process, such as, control statements giving details of (a) indents awaiting purchase action, (b) of acceptance notes awaiting delivery by contractors; Indents held up in Planning Directorates and awaiting transmission to purchase branches; analysis of the total value of purchases made by the Supply Department under various heads ("Article Group", "Province", and "Method of Purchase"); analysis showing comparative value of purchase made in provinces by Controllers of Supplies on the one hand, and Directorates General of Supply and Munitions Production, etc., on the other; and other ad hoc statements of a miscellaneous nature.
- II. Registers prepared both by manual and mechanical process (latter, as a purely experimental measure) such as Progress Registers; Article Registers (called "Rate Cards" under the manual system), and Contractor's Ledgers (called "Performance Cards") under the Manual System.

Under category I, the question of discontinuance of the manual system did not arise. As regards the Registers mentioned in category II above, they were being prepared concurrently by manual and mechanical processes. The main registers were Progress Register, Article Register and Contractors' Ledger. The Progress Register was designed to give complete details of each and every indent received in the Purchase Branch, of the purchase action on it up to the stage of issuing the Acceptance Notes and of the deliveries which come forward from time to time and were accepted in inspection. The mechanically produced Progress Register gave all the information that the manual did and was accepted as satisfactory by the heads of all the Purchase Branches.

The Manual counterpart of the Article Register was called the Rate Card (a separate card being maintained in respect of each separate article) but this only showed the total quantity ordered, and the rate at which each order was placed in respect of each article. The mechanical counterpart called the "Article Register" gave not only this information but further information of all the indents received in respect of each article and all the acceptance notes issued in respect of it from time to time including various suppliers from whom it was ordered at various times (together with rates, of course), and all the deliveries made by contractors from time to time.

The manual counterpart of the contractors' ledger was called the "Performance Card" (a separate card being maintained in respect of each contractor). It only showed the total quantity of each article ordered from each contractor. The mechanical counterpart called the contractors' ledger gave complete details of all the acceptance notes issued in favour of each separate contractor in respect of each separate article and also of the deliveries made by him of each article. The three registers were posted on a day-to-day basis by pasting in strips cut out from copies of one and the same machine-printed statement; no extra machine time therefore was taken to produce these registers and absolute accuracy was ensured by having all the registers "paste-posted" from one and the same machine produced statement. The administrative authorities concerned all agreed that the mechanically produced Progress Register, Article Register and Contractor's Ledger could be substituted in place of their manual counter parts with effect from the 1st June, 1942 and in the case of statements and returns system was automatically placed on a permanent footing. Mr. Menon vacated the post of Chief Statistical Officer in June 1942.

It was felt about November 1943 that though the mechanical system had been in force for nearly three years, the compilation of statistics and preparation of control and progress statements had presented difficulties throughout. There was failure (for a variety of reasons) on the part of the Purchase and Planning authorities to enforce the strict observance by their staff of the rules of procedure laid down by the Statistical Organization. Moreover some of the machines were re-built second-hand machines which did not function smoothly and required frequent repairs. The smooth working of the mechanical system was also retarded by the difficulty of getting an adequate number of skilled operators. On careful review, it was found that the manual system was better suited for the preparation of Record Statistics, Control and Progress statements required by the Supply Department. Government accordingly decided that the preparation of statistics on Hollerith machines should be discontinued from the 1st January, 1944, and that from this date statistics should be compiled by the Manual Method.

This decision was implemented and new forms were evolved in consultation with the Chief Statistical Officer. Government's own Hollerith machines and their accessories, etc., were disposed of and hired machines returned. Thus since January 1944 statistics are being maintained on a manual basis excepting the Medical Division of the Directorate General of Supply where a couple of machines remained and mechanical statistics continued to be prepared.

CHAPTER XX

CREATION AND GROWTH OF THE DIRECTORATE GENERAL OF AIRCRAFT

Before the war, facilities for the repair and maintenance of aircraft were practically non-existent, and although flying clubs had their own small workshops for minor running repairs and maintenance, the capacity available in these workshops was neither adequate nor up-to-date. As the war operations extended to the Eastern Theatre and particularly on the entry of Japan in the war, it became evident that repair and maintenance facilities should be provided in India which soon became an important base for operations.

A Civil Repairs Organisation and a RAF Directorate were therefore set up in DGMP in 1941-42 which could be used by the RAF for general purposes through the Military Provision Offices for "common user" stores or directly for the repair and maintenance of aircraft and engines, motor vehicles and motor boats and the procurement of aircraft components, tools, ground equipment and similar items.

About June 1942, the Inspector General, Ministry of Aircraft Production, visited India and discussed the question of directing India's industrial output to obtain maximum assistance for Air Forces in India. Consequently, it was decided that the Air Ministry and the Ministry of Aircraft Production, London, should send a team of technical officers to study the problems on the spot and give necessary assistance and advice. It was considered, that these very officers could be left in India as part of the new organisation for Air Forces Supplies within the Supply Department. In the meantime a provisional schedule of classes of RAF equipment which should be considered for manufacture in India was drawn up by the Director, Civil Repairs Organisation at the instance of Air Headquarters (India). This schedule was necessary because there was urgent need of conserving shipping and utilising local resources to the best advantage. In collaboration with the Central Provision Office a list of items suitable for indigenous production, was prepared. It contained items like airframe components, engine components, engine accessories, airscrew components, airframe accessories, armament, signals, photography, ground and marine equipment, etc. In July 1942, it became evident that our efforts to develop civil capacities were handicapped owing to the location of DGMP at Calcutta and the Air Headquarters at Delhi as the two organizations could not collaborate in day-to-day technical planning, and it was felt that the Supply Department could not give any undertaking to produce any items without investigation on quantity basis and detailed planning.

The Ministry of Aircraft Production in August 1942 sent Sir James Pitkeathley to India to examine the extent to which India's manufacturing resources could be utilised for the supply of aeronautical equipment and for the repair of aircraft, to assess the capacity of India for the manufacture and repair of aeronautical supplies in India and also to estimate the assistance required. Sir James Pitkeathley, was of the opinion that substantial results had already been achieved by the Supply Department's Civil Repair Organisation in collaboration with Air Headquarters not only on repair of aircraft and components but in actual manufacture of components, miscellaneous equipment, tool kits, etc., and that with the expansion of the organisation, a substantial development in manufacture of aeronautical supplies could, with confidence, be anticipated.

As a result of this recommendation, it was decided to create a Division in the Supply Department. The reasons for locating this organisation in that Department were—(a) it virtually controlled all industrial capacity and raw materials;

(b) it had complete staff and facilities for reception, planning and distribution of works programmes and common services; (c) a duplication of the Supply Department was practically impossible due to shortage of administrative and technical personnel; and (d) capacity must in many instances be shared with that Department. The Supply Department, however, agreed that the Air Headquarters could exercise essential control of the new organisation and that the programmes both for production and repairs would be settled entirely by the Chief Maintenance Officer.

Creation of the Aeronautical Stores Division.—About October 1942, the arrangements under which the RAF could operate in the Indian supply fields were:—

- (a) Any items included in the range of any ordinary Dte. in the Supply Department were obtainable by an indent on the appropriate Directorate or in case of supplies common to other Army Units by indent on the appropriate military provision office, which formed part of the general load on the Supply Department.
- (b) The repair and maintenance of airframes, aircraft engines, motor, vehicles, motor boats, etc., and the procurement of aircraft components, tools, ground equipment and similar items could be arranged through the special RAF Directorate and Civil Repairs organisation under DGMP to serve North-Eastern India only, and by the principal and subsidiary contractors (which included Tatas at Bombay, INA at Delhi and U. P. Government at Cawnpore).

The principal and subsidiary contractors were used by Air Headquarters directly for repairs and maintenance and in case of any difficulties they approached the Controller of Supplies concerned.

The above arrangements were, however, found defective owing to lack of superior direction (both technical and administrative), absence of co-ordinated regional organisation and tendency to independent action by individual branches of AHQ and even by individual officers. It was, therefore, decided to substitute a new organisation covering the whole of India on a uniform plan for the organisation described under head (b) above. This Organisation was to be known as the Aeronautical Stores Division under a Deputy Director General supported by (i) two Directors responsible for Repairs and Maintenance and Manufacture respectively, (ii) five Circle Offices each under a Deputy Director, and (iii) for certain purposes, the offices of the Controller of Supplies. This Division was to be located in the DGMP, Calcutta. The Division became responsible for all the RAF requirements of (a) repair and maintenance of aircraft, motor vehicles and motor boats (including engines, instruments and accessories) and wireless equipment placed upon it by AHQ, and (b) for procurement in India by purchase or manufacture of goods of an engineering character which could not be handled more effectively by other branches of the Supply Department. The Division also provided all raw materials, machine tools and equipment required for the work other than special raw materials and equipment (e.g., non-ferrous metals of RAF specifications, spare parts for aircraft and special tool kits), the responsibility for providing which rested with AHQ. As part of his Repair and Maintenance programme, each Deputy Director was to establish a Civil Salvage Depot and a Repairable Equipment Depot.

The AHQ appointed Liaison Officers who were made the normal channels of all communications between the Supply Department and Air Headquarters. These officers were to be kept fully informed of the activities of the Aeronautical Stores Division and invited to all discussions of any importance. An Aeronautical Inspection Section was also set up under the AHQ and was quite separate from the Civil Aviation Inspectorate. This Section was responsible for all inspection on behalf of the RAF and included a Research and Development Section which used the laboratory of the Board of Scientific and Industrial

Research and developed research results up to the points at which industrial production could be attempted.

Creation of the Directorate General of Aircraft.—In September or October 1943—with the increase in the volume of work and on account of large demands on the limited capacity in India—it was felt that the work of organisation for repairs and supplies for the RAF required a separate organisation and a full-fledged Directorate General. The Government of India, therefore, sanctioned the creation of a new office under the Supply Department to be known as the Directorate General of Aircraft with headquarters at Calcutta with effect from 18th October 1943. This Organisation absorbed the Aeronautical Stores Division of the DGMP.

The new Directorate General was made responsible for the following:—

- (a) Repair and maintenance of aircraft, motor vehicles and motor boats (including engines, instruments and accessories) wireless and signal equipment for the Air Forces in India;
- (b) The procurement in India by purchase or manufacture of
 - (i) all spare parts of aircraft and aero engines which are included in the schedules of spare parts relating to various types of aircraft in use in India;
 - (ii) all goods and articles set forth in the sections of the vocabulary of Royal Air Force Equipment (A. P. 1086).

All Royal Air Force indents for items referred to above were placed direct on him with effect from 1st April 1944. He also dealt with demands for all types of Jettison tanks and transferred to the other Directorates General any demand or portion of a demand he desired them to handle. Such transfers were made to the Directorates General concerned under the cross-mandate system. The DGA was also responsible for progressing indents retained by him and set up his own Central Indents Section.

A Branch Secretariat (Aircraft) under a Deputy Secretary was also attached to the DGA like other Directorates General so as to make it a self-contained unit. The Joint Secretary (Munitions Production) became Joint Secretary (Munitions Production and Aircraft) for the purpose of overseeing the work of the Branch Secretariat (Aircraft). When the Headquarters of the Directorate General were shifted to Lucknow in 1945, the Branch Secretariat (Aircraft) became directly responsible to the Main Secretariat.

CHAPTER XXI

CREATION AND GROWTH OF THE DIRECTORATE GENERAL OF DISPOSALS.

Prior to the creation of the Directorate General of Disposals, disposals were handled by a Section in each of the two Purchase Organisations at Delhi and Calcutta and the value of the disposals was small. In view of the need for more effective and expeditious utilisation and disposal of military salvage as well as of salvage and surplus stores arising in other departments of the Government of India during the war and so as to lay the foundation of a post-war Disposal Organisation, the Government of India created the Directorate General of Salvage and Disposals in November 1943 and attached it to the Directorate General of Supply.

The main functions of this organisation were to ensure the effective and expeditious utilisation and disposal of all salvage, surplus or obsolete stores arriving in army units and installations in India or received from overseas operational areas, which were not required by the Defence Services. The Directorate General also dealt with any other salvage and surplus stores reported to it for disposal by other departments of Government and also with ships salvage. The Disposals organisation also arranged for the reconditioning, sorting and grading of salvage and surplus stores and also for breaking down of such salvage and stores where necessary for their better utilisation.

This Directorate General commenced work in November 1943 with a Head Office in Delhi and Branch offices in Bombay and Calcutta. At Delhi in the beginning only a Director was appointed. Later another Director in charge of Statistics was appointed. Disposals work in Karachi, Lahore, Cawnpore and Madras was done by the Controllers of Supplies as its Agents. As the work in Calcutta and Bombay increased in importance and value, it was decided that separate Disposals Officers should be appointed, but they were placed under the administrative control of the respective Controllers of Supplies.

Reports of true surpluses are made direct to the Director General (Disposals) by—

- (i) the Military store-holding authorities on behalf of the War Department;
- (ii) the procurement departments of the Government of India; and
- (iii) other civil departments of the Government of India.

The Provincial Governments and Governments of Indian States, may, if they desire to utilise the services of the Central Government's Disposals Organisation, similarly report surpluses to the Directorate General (Disposals) if the value exceeds Rs. 2,500. Once surpluses are so reported, the question of disposal is entirely a matter for the Central Disposals Organisation.

Disposals Board.—In September 1944, a Disposals Board consisting of representatives of the Industries and Supplies, War, Commerce, Food and Finance Departments of the Government of India and of the Ministry of Supply Mission in India, was constituted as the authority to control all disposal operations and to deal with questions of policy arising in connection with the disposal of surpluses. The Secretary, Industries and Supplies Department, is its chairman and a Joint Secretary in that department is *ex-officio* Secretary to the Board which ordinarily meets once a month.

Executive Organisation.—The responsibility for the execution of decisions of the Disposals Board and for the presentation to the Board of data necessary to arrive at decisions is vested in the Director General (Disposals).

With the end of hostilities, the disposals work increased enormously and the Disposals Organisation was expanded. With effect from the 17th December 1945, a whole-time Director General was appointed. The organisation covers the whole fields of serviceable articles, plant, machinery, etc., declared surplus by the Defence Services, Civil Departments of the Government of India, HMG and USA authorities. It also covers salvage and scrap.

The Director General of Disposals is empowered subject to the sanction of the Board in each case, to dispose of all factories, industrial units, hospitals and buildings (including buildings which were designed to take plant and equipment). All other land and buildings of the Defence Services are disposed of by the Lands, Hirings and Disposals Directorate. Similarly, Land and buildings of other departments of the Central Government may be disposed of by the Department in possession.

At headquarters, the Director General has a staff of four Deputy Directors-General; a number of Directors and other Junior Officers, as required. Regional Commissioners of Disposals have been appointed at Calcutta, Bombay, Lahore and Cawnpore. A Joint Financial Adviser (Disposals) with appropriate staff is attached to the Director General and acts as his Financial Adviser.

Advisory Committees.—A Central Advisory Committee has been set up to advise the Director-General on any general questions on which its advice may be sought. It also serves as a link between the Industries and Supplies Department and the commercial community, helps to reconcile any conflicting interests so as to facilitate the disposal of stores in accordance with the general policy laid down by the Disposals Board, and brings to the notice of the Director General of Disposals any matters concerning disposals that appear to require action by the Government of India. Regional Advisory Committees, with similar functions, have also been set up at Calcutta and Bombay to advise the Regional Commissioners.

Volume and value of Disposals.—The total net arisings from 1st October 1944 to 31st July 1946 (book-value) were of the value of Rs. 11,077 lakhs. The total net disposals (book-value) from 1st October 1944 to 31st July 1946 amounted to Rs. 2,859 lakhs; the actual net sale value during this period amounted to Rs. 1,975 lakhs.

CHAPTER XXII

CREATION AND GROWTH OF THE IRON AND STEEL CONTROLLER AND THE STEEL COMMISSIONER'S ORGANISATION

(a) **Creation of the Iron and Steel Controller.**—In peace-time India produced about 700,000 tons of saleable steel per annum and imported 350,000 tons to meet an annual demand of about 1,050,000 tons. Almost immediately on the outbreak of war imports fell off and the demand for steel for war purposes began to rise rapidly. It soon became clear that all demands could not be met and a system of priorities was introduced. This generally meant that war orders were placed on first priority, demands from railways and other important civil demands were placed on second priority and other demands had no priority. There was no statutory control but orders were accepted on a priority basis by the main producers and the principal re-rollers. At first orders were allotted priority by the Director (Metals) in the DGMP. As the volume of work thrown on the Adviser on Steel Supplies, who was appointed on 1st October 1939 to advise Government to obtain iron and steel for war purposes, increased, the organisation was strengthened by the recruitment, in an honorary capacity, of officers drawn from the trade. This organisation helped to ensure that deliveries were effected in accordance with the allotted priorities.

At the end of February 1940, the Secretary of State telegraphed stating that the steel position in the UK had become difficult and to ensure an equitable distribution of available steel supplies, it had been decided to institute a scheme of rationing on the basis of a definite allocation to each country and that in order to ensure that the allocation was not exceeded, it had been decided that in future no steel could be supplied from the UK for India without a recommendation issued by the War Supply Board. To operate this quota a Steel Quota Section was established in the Department of Supply. In the meantime import position continued to deteriorate while the indigenous capacity became more and more over-loaded. Towards the end of 1940, therefore, Government found it necessary to establish control of imports and the operation of the control of steel imports under this system was introduced under the DGMP in his capacity as Steel Controller. This control dealt with imports of steel from the USA as well as from the UK.

By this time the books of the main producers were completely over-loaded with first priority orders and orders on second priority had no chance of execution. These included all railway demands and demands for essential civil purposes. It, therefore, appeared that unless a system of rationing was introduced, the railways and essential civil users would get no steel. A comprehensive system of control, covering production, import and distribution including price control, was worked out. In spite of opposition to this centralised and full-blooded measure of control, a statutory control of distribution was introduced on 1st August 1941 under the Iron and Steel (Control of Distribution) Order 1941. The powers of Priority Authority were delegated to H. E. the C.-in-C. who nominated the M.G.O. to exercise these powers on his behalf. Certain departments were appointed "Schedule departments or Quota Holders" and to them was assigned the duty of rationing steel to users who came within their purview. The Adviser on Steel Supplies was appointed Iron and Steel Controller under the new Order and his statutory and executive functions were laid down by Government.

To assist him in performing his day-to-day duties the services of representatives of the main steel producing companies, re-rollers, steel fabricators, and stockholders were obtained. Furthermore an Iron and Steel Control Board was constituted with the Iron and Steel Controller as Chairman to advise on questions of iron and steel control policy and the working of the iron and steel

control scheme. The Board was to have as members a representative of each of the main steel producing firms of re-rollers, of steel fabricators and of other users of steel and a Government servant was appointed to act as Secretary. The D.G.M.P. who, as Steel Controller for India, had been controlling imports of steel was designated Steel Import Controller and the relationship between the Iron and Steel Controller and the Steel Import Controller was defined. Later on, three more Control Orders connected with the iron and steel *via.*, Iron and Steel (Movement by Rail) Order, 1942, Iron and Steel (Movement by Road and River) Order, 1942, and Iron and Steel (Scrap Control) Order, 1943, were issued. Five Deputy Iron and Steel Controllers were appointed in March 1943 with headquarters at Bombay, Cawnpore, Madras, Lahore and Calcutta to assist the Iron and Steel Controller in the administration of the above Control Orders in their respective circles.

Later, early in 1944 it was decided to secure a more homogeneous control over steel in India (a) by increasing the number of controlled categories by adding steel pipes, tubes and fittings, wire ropes and wood screws to the Iron and Steel (Control of Distribution) Order, 1941, and (b) by planning or replanning under the Iron and Steel Controller the administration of the control of all categories of iron and steel included in the Order. The Distribution Order Division of the Steel Control was strengthened and planning and production officers designated as Iron and Steel Control Directors were appointed. The Purchase Branch, the Price and Accounts Division and the Statistics and Co-ordination Divisions were also suitably strengthened.

(b) **Unification and centralisation of control and appointment of the Steel Commissioner.**—At the end of 1943 functions relating to steel control were being performed by three different authorities. Some of the Iron and Steel Controller's functions relating to certain categories were being performed by the D.G.M.P., other items of steel, such as Pipes, were controlled by the D.G.M.P., under separate Control Orders. The D.G.M.P. was also responsible for Steel Works expansion while the Iron and Steel Controller was responsible for production. Steel imports were administered by the Controller of Steel Imports while the fabrication of steel was the responsibility of the D.G.M.P. and several other authorities. With the increase in war activities the rationing of steel by the Allies had to be considered on an International scale and it was necessary that statistics from all Allied countries should be prepared in the same form. It was also felt that the lack of co-ordination in guiding steel production and imports, in rationalising fabrication and in regulating demands and consumption was proving a retarding factor in achieving the maximum production of iron and steel and successful administration of the Control Order. The situation was accentuated by arrival of large shipments of steel and by increasing difficulties of internal transport. Teams to re-cast orders on 'fabricators' books and to severely scrutinise indentors' forward demands as to essentiality, end-use etc., were constituted. The system of priority basis in case of coal distribution to an allocation basis was also changed. Scrutiny of deliverable amounts of coal involved almost certainly some temporary closing of blast furnaces as well as severe rationalisation of re-rollers to obtain economic use of coal. A thorough effort to ensure that Indian production of steel was better balanced was also necessary. These considerations brought forcibly to that front the need for an officer at a high level and the Government of India, therefore, obtained from the U.K. Steel Control the services of Mr. F. E. Parr as Steel Commissioner in India to deal with the question of statistics, the unification of control and the co-ordination of the work of the fabricators. On the recommendations of the Steel Commissioner the control of all steel categories was unified under the Iron and Steel Controller and separate orders such as the Pipe Control Order abolished. All the functions of the Steel Controller which were being carried out by the D.G.M.P. were transferred to the Iron and Steel Controller and a new clause

introduced into the Control Order giving the Iron and Steel Controller statutory power to regulate Steel Works extensions and the creation of new steel producing capacity. The name of the Order was amended to read "The Iron and Steel (Control of Production and Distribution) Order, 1941." It was not found expedient to bring the control of imports within the Iron and Steel Controller's organisation, but for closer liaison the office of the Controller of Steel Imports was located in the office of the Iron and Steel Controller.

(c) **Formation of the Iron and Steel Branch Secretariat.**—In order to facilitate the operation of the growing organisation of the Steel Control, it was agreed that the Secretary of the Iron and Steel Control Board should exercise powers as a Deputy Secretary to the Government of India. For this purpose an Iron and Steel Control Branch Secretariat consisting of the Deputy Secretary and an Assistant Secretary was established in April 1944.

(d) **Abolition of the post of Steel Commissioner.**—The post of Steel Commissioner was abolished with effect from the 1st September 1945 and a new post of Steel Adviser to the Government of India was created.

CHAPTER XXIII

CREATION AND GROWTH OF THE COAL COMMISSIONER'S ORGANISATION

Before the War there was no statutory control over the distribution of coal, although priority in wagon supply was given to particular consumers, such as the Railways, Public Utilities, and Iron and Steel works. The pressure on transport, however, became so severe in the early years of the War that a Controller of Coal Distribution was appointed in March 1942 to regulate the priorities of wagons to coal consumers. There was at that time no question of insufficiency of coal at the pitheads. Raisings exceeded despatches and the system of distribution was conditioned mainly by limitations of transport. This position continued throughout 1942 and the greater part of 1943, although production caused anxiety in the coal fields outside Bengal and Bihar where the wagon position was generally easier and loadings below the wagon capacity.

Towards the end of 1943, however, there occurred a serious fall in raisings and it became necessary to ration supplies of coal and take concerted measures to keep the raisings to a reasonable level.

Different departments were dealing with production, distribution and fixation of price. The Railway Board was responsible for production of coal from Government owned mines and fixation of price of that coal, the Labour Department for encouraging and supervising the production of coal from privately owned mines and the War Transport Department for the distribution of all coal produced at privately owned mines through the Controller of Coal Distribution.

Early in 1944, the Government of India appointed a Coal Commissioner to co-ordinate and supervise the work of these three Departments. It soon became apparent, however, that it would be necessary to give the Coal Commissioner wide executive powers. If this was to be done satisfactorily it was felt that he should be responsible to one Department of the Government of India only. It was decided that the most suitable Department should be the Supply Department as it had had more experience than any other Department of Government of the organisation both of war supplies in general and of executive bodies to deal with those supplies. From 1st June 1944, therefore, the functions hitherto discharged by the Labour, Railway, and War Transport Departments in regard to the distribution and production of coal became the responsibilities of Supply Department. Labour Department continued to deal with labour for coal mines and with welfare and safety in mines.

The Coal Commissioner's office was set up in Calcutta; the principal coal fields being within easy distance of Calcutta and most colliery firms have their headquarters there. The functions of the Coal Commissioner were:—

- (1) to increase the raisings of coal in the country as a whole;
- (2) to ensure that the demands of consumers were met as far as possible.

The Coal Commissioner was assisted by two Deputy Coal Commissioners in charge of Production and Distribution respectively. The Chief Mining Engineer (Railway Board) became the Deputy Coal Commissioner (Production) and continued to act as the head of the State Railway Coal Department which had now been transferred to the control of Supply Department. The Controller of Coal Distribution (War Transport Department) was appointed Deputy Coal Commissioner (Distribution). While the DCC(P) was responsible for the planning and execution of new projects, and for the procurement of colliery stores, in addition to the Control of all Railway collieries, the D.C.C.(D.) was responsible for the estimate of requirements and allocation of coal, inspection and movement of coal, fuel economy measures and statistics.

In addition to these two officers at headquarters, a number of executive officers were appointed under the Coal Commissioner in the coal mining areas. They were designated Regional Coal Controllers, and were appointed for the Bengal, Bihar, Punjab, Baluchistan, Assam, Central Provinces and Talcher coalfields. Two Regional Coal Controllers were appointed in the Bengal and Bihar fields, one to be in charge of production and the other in charge of distribution. The duties of the Regional Coal Controllers mainly were to ascertain from collieries within their areas their essential requirements of colliery stores, bring to the notice of the Coal Commissioner problems hampering production, control the stacking of coal by collieries, deal with the distribution of wagons in accordance with the general orders of the Coal Commissioner and exercise control over the grading, sampling and inspection staff of the Coal Commissioner in their areas.

To deal effectively with the requirements of the Coal Commissioner's organisation, a Branch Secretariat (Coal) was established at Calcutta consisting of a Deputy Secretary, an Under Secretary and two Assistant Secretaries. This Branch Secretariat worked directly under the Main Secretariat of the Supply Department and dealt with all references regarding appointments, establishments, etc., in the Coal Commissioner's organisation, and with all other matters of policy and day-to-day administration requiring the orders of the Governor-General in Council. In addition the Coal Commissioner and the Branch Secretariat were given a Deputy Financial Adviser.

Government also undertook on behalf of the colliery owners to import the necessary equipment and bulk orders for plant and machinery were placed on the U.K. in the early part of 1944. Government also entered into arrangements with a firm of American Contractors for large scale mining operations with mechanical equipment and a Directorate of Open Cut Coal Mining was constituted with effect from 1st December 1944 (which also took over work previously done by army units) to carry on operations with the help of machinery purchased from America.

CHAPTER XXIV.

SUPPLY DEPARTMENT STANDING ADVISORY COMMITTEE, PROVINCIAL ADVISORY COMMITTEES, ADVISERS ON DIFFERENT INDUSTRIES, ADVISORY COMMITTEES AND PANELS.

Standing Advisory Committee for the Supply Department.—It is a long established practice in every Department of the Government of India to have a Standing Advisory Committee presided over by the Honourable Member in charge and having representatives from the two Legislatures. A Standing Advisory Committee was, therefore, attached to the Department of Supply soon after its creation to advise on the subjects with which it was concerned. This Committee still continues, though non-official members have been changed from time to time.

Provincial Advisory Committees.—One of the important functions of the Controllers of Supplies was to establish and maintain close contact with the Governments of the Provinces and Indian States and with the important commercial and industrial associations and to locate industrial capacity. For the latter function the Controller necessarily required help from non-officials in touch with trade and production. The Government of India, therefore, asked the six Provincial Governments to form Provincial Advisory Committees to place at their disposal all the local information available and to endeavour to smooth over any trade or industrial difficulties in meeting war supplies that might arise. Accordingly the U.P., Bengal, Madras, Sind, Punjab and Bombay Governments constituted the Provincial Advisory Committees in 1940. A high official of the Provincial Government was generally appointed as Chairman and the Controller of Supplies as Vice-Chairman, the other members being non-officials from important commercial, mercantile and industrial elements. The terms of reference of the Advisory Committees were, broadly speaking, as follows:—

- (a) to advise the Government of India in the Department of Supply on any general question on which advice might be sought; and
- (b) to serve as a link between the Government of India (Department of Supply), the Provincial Government and the commercial communities of the province, to re-concile and to co-ordinate their interests to the general benefit of facilitating the procurement of war supplies and to bring to the notice of the Department of Supply through the Controller of Supplies any matters concerning war supplies that appear to require action by the Government of India.

Advisers on Different Industries.—The Department realised from the very beginning that to meet the demands expeditiously and economically, it would be essential to carry the industry with it and the secret of success was the close understanding with it. It was, therefore, decided to have representatives of major industries associated with the Department as Advisers or Liaison Officers. The first Liaison Officer (later designated as Adviser) appointed in September 1939 was for Petroleum Products. As it became necessary to harness the capacity of other industries, advisers for the Tanning and Leather, Woollen, Engineering, Jute, Steel, Dyes, Rope, Web Equipment and Cement Industries were taken in. All these persons were generally drawn from the prominent firms in each industry. Broadly speaking, their main functions were to advise the Department on all matters relating to the industry which they represented with a view to ensuring that all demands for War supplies were arranged in the most economical and expeditious manner and any difficulties encountered by the industry in regard to shortage of materials, coal, transport

and other allied articles were brought to the notice of Government. In some cases, the Advisers also helped the Department in allocating orders to the industry, e.g., Adviser on Jute Supplies and Adviser on Rope Supplies. Some Advisers also assisted in administering the controls affecting their industries, viz., Adviser on Tanning and Leather Industry. Prices, etc., were also fixed in consultation with the Advisers. The system of appointing Advisers has proved of immense value and the fact that there have rarely been any disputes with the industry, in spite of the fact that there are very few organised industries in India redounds to their credit.

All Advisers worked in an honorary capacity but they had to follow the Home Department orders for honorary workers, viz., a declaration to the effect that their attention had been drawn to the Officials Secrets Act and that they realised that they were bound by it and that they had read rules 17 and 23 of Government Servants Conduct Rules and considered themselves bound by the provisions of these rules.

Advisory Committees.—To bring the non-official opinion in closer touch with the working of the various control and other schemes for meeting war supplies, several Advisory Committees were constituted by the Department. The first Committee was the Munitions Production Advisory Committee, formed in 1940 to advise the D. G. M. P. on all matters connected with the production of stores handled by him. Later, many Advisory Committees, viz., General Advisory Committee, Advisory Committee of Manufacturers of Engineer Stores, Carbon and Graphite Electrodes Committee, the Railway Wagons Production Committee, Advisory Board for Road-making, Agricultural Machinery, Pneumatic Tools and Air Compressors, Advisory Board for Refractory Stores, Central Chemical Advisory Committee, Standing Chemical Advisory Committee, the Tar and Tar Products Control Advisory Committee, Medical Stores Advisory Committee, Medical Stores Supply Committee, Central Sleeper Committee, Shellac Liaison Committee, Committee of the Tanning Industry, Jute Liaison Committee, Wool Textiles Control Committee, Coal Advisory Committee and Technical Regional Advisory Committee for Bengal, and Bihar Coal-fields were constituted from time to time. These Committees were mainly advisory and had no executive functions; excepting four Committees, viz., Advisory Committee of Manufacturers of Engineer Stores, Advisory Board for Road-making and Agricultural Machinery, Pneumatic Tools and Air Compressors, Advisory Board for Refractory Stores and Shellac Liaison Committee which were presided over by non-official chairmen, all other Committees had official chairmen. In general, their functions were to advise the Department on the problems connected with the stores with which they were concerned. All important units of the industry were represented on the Advisory Committee of that industry along with, of course, official nominees of Government. Through these Committees Government took advantage of the accumulated experience and expert advice of the Trade and Industry.

In addition to the Advisory Committees, Panels were also set up for various commodities. An Advisory Panel of Importers from the U. K. was set up in the D. G. M. P. to advise Government as to the quantity which should be allowed to be imported taking into account the essential needs of Government Departments, public utility services, war industries and civil requirements essential to the war effort and to advise Government on the allocation of these quantities between the various importing houses. Twenty-three working panels—one for each of the main classes of articles to which the Panel Imports Scheme applied were also formed under the advice of the main Advisory Panel to advise Government on the quantity to be imported and its allocation between the various importing houses. All these panels were composed entirely of non-official members, representatives of the interested firms and the meetings were also presided over by the non-official chairmen. Some of the important working panels were for Boilers, Batteries, Petrol kerosene engines up to 20 H.P. excluding all automobile units, Abrasives, Pneumatic Plant consisting of Tools and Auxiliary equipments.

Hand Tools, Motor and Generators of any type or design, Distribution and power Transformers, etc., etc. The other panels were Machine Tools Advisory Panel, Aluminium Advisory Panel, Lamps Manufacturers Advisory Panel, Packing Cases Panel, Tent Poles Panel, Industrial Chemicals Advisory Panels for Calcutta, Bombay and South India, Advisory Panel for Soap and Glycerine, Advisory Panel for Sulphuric Acid and auxiliary products, Cement Advisory Panel, Hosiery Needles Advisory Panel, Paints Advisory Panel and Ship Repair Panels. In addition, the Indian Engineering Association at the suggestion of the Adviser on Engineering Supplies set up various panels at four important centres, Calcutta, Madras, Bombay and Karachi. These were Structural Engineering Panel, Mechanical Engineering Panel, Wagon Manufacturing Panel, Railway Truck Materials and Signals Panel, Steel Castings Panel, Non-ferrous Castings Panel, Rivets, Nuts and Bolts Manufacturers' Panel for the Calcutta area, Madras Regional Committee and Madras Structural Engineering Panel for the Madras area, Karachi Regional Committee for the Karachi area, and Bombay Regional Committee, Structural Engineering Panel, and Mechanical Engineering Panel for the Bombay area. The object of these panels was to consider the problems faced by the firms in these areas in regard to the stores for which these Panels were formed. These Panels forwarded their views to the Indian Engineering Association. Most of the above Panels had non-official Chairmen and the majority of the members were also non-officials. While the Advisory Committees were concerned with an industry as a whole, the Panels advised Government on the day-to-day problems faced by a particular and limited section of an industry.

CHAPTER XXV

ORGANISATION AT ITS PEAK—V. J. DAY.

Fundamentally the Department of Supply did not differ from other departments of the Government of India. In charge of it was a Member of His Excellency the Viceroy's Executive Council responsible to the Council for implementing the general policy of the Government of India in so far as his department was concerned. In his relation with the Executive, that is with the officers of the Directorates General whose business it was actually to carry out this policy and the work of the department generally, the Member-in-charge was assisted by a Secretariat. The duties of the Secretariat very broadly included the transmission of the general orders of Government to the Executive, including sanctions in cases where the formal sanction of Government was necessary, and the co-ordination of action on issues which re-acted on other departments of Government, and in all matters requiring formal reference to authorities not under the control of the Government of India. Further, the Secretariat had established Branch Secretariats with DGMP, Steel Commissioner, Coal Commissioner, D.G. (S & D) DGA and DGSR to carry on and assist the executive authorities in matters where otherwise reference was necessary to Main Secretariat. With the concurrence of the Finance Department (which were attached to each Secretariat) the Branch Secretariat could issue all orders, ordinarily issued by a Secretariat at headquarters, except those which involved policy decisions or committed more than one Directorate General or other departments of the Government of India.

The executive responsibility and control of supplies were divided as follows:—

(a) **The Director General (Munitions Production)** with headquarters at Calcutta dealt, broadly speaking with ammunition production and supply of engineering stores. The Ordnance Factories Directorate under him was responsible for the production of munitions of war such as rifles, guns, machine guns, explosives and small arms. It also produced specialised items like smoke equipment, benzol and other chemicals needed in the production of explosives. Another large field was the production of Armoured Fighting Vehicles.

On the engineering side, all the various branches of Engineering were covered by Directorates dealing with Structural items, Mechanical items, Electrical plant and equipment, welding and press work and civil engineering. The capacity of the civil engineering workshops was harnessed to the production of munitions items including parts of shells, fuzes, etc.

This Directorate General also dealt with Railway requirements, notably the large programme for producing wagons and arranged a large range of miscellaneous railway demands required for the maintenance and upkeep of railways.

The Machine Tool Control was another important phase of the activities of this organisation. It covered planning and production of machine tools in India, arrangements for the import of machine tools which could not be manufactured in India. Non-ferrous metals were another important responsibility of this Directorate General and the Division dealing with this had to supervise the production of non-ferrous metals in India, arrange for the distribution of imports and administer the Non-Ferrous Metals Control Order. The Chief Controller of Purchase (Munitions) was responsible for the purchase and supply of all stores falling within the sphere of this Directorate General.

(b) **The Director General of Supply** at Delhi was responsible, broadly speaking, for the production and procurement of "General Stores" or "Non-munition" items. Through different Directorates he dealt with Clothing,

Harness and Saddlery, Footwear, hides and skin, Timber, Woodware, Body-building and assembly of Chemicals, Woolen textiles, silk, parachutes, paints and gases, rubber manufactures, petroleum, drugs and dressings, surgical instruments, paper and its products and miscellaneous stores like Crockery, cutlery, glass etc. He also dealt with the cement industry through the Honorary Cement Adviser. The Chief Controller of Purchase (Supply) was responsible for the purchase and supply of these stores.

(c) **The Director General, Shipbuilding and Repairs** stationed at Bombay dealt with the building of new naval craft such as trawlers and smaller craft down to Dinghies, and with repairs both of Naval and Merchant ships. He also handled production of Harbour Craft required by QMG and the Port Trusts. A Deputy Controller of Purchase was responsible for placing contracts and making purchases.

(d) **The Director General, Aircraft** with headquarters at Lucknow was responsible for the manufacture of aircraft parts and spares and the repair of damaged aircraft. A Purchase Branch as in other Directorates General was associated with this Directorate General also.

(e) **The Steel Commissioner** at Calcutta besides administering the Iron and Steel (Control of Production and Distribution) Order, 1941 and other allied controls through the Iron and Steel Controller and controlling the import of steel from abroad through the Deputy Steel Import Controller was also responsible for fostering and controlling expansions of steel-making capacity and for the production of special types of steel. He recommended the import of the necessary plant, both for replacement and expansion and for miscellaneous purposes.

(f) **The Director General, Disposals**, at Delhi ensured the effective and expeditious utilisation and disposal of all salvage, surplus or obsolete stores arriving in Army Units and Installations in India or received from overseas operational areas which were not required by the Defence Services.

(g) **The Electrical Commissioner**, with headquarters at Calcutta was responsible for controlling and expansion of electric output and for assisting existing Electric Supply Companies to obtain their essential maintenance requirements. He controlled a pool of small power units which could be used to supplement existing production to meet new demands for electric power resulting from the expansion of industrial or other demands.

(h) **The Coal Commissioner** at Calcutta was responsible for the control of production and distribution of coal.

(i) **Controllers of Supplies** with headquarters at Bombay, Calcutta, Madras, Karachi, Cawnpore and Lahore were responsible for the assessment and allocation of capacity and for procurement of stores in their respective circles. They also established and maintained close contact with the Provincial Governments, the Chambers of Commerce and Industries in their circles.

(j) **India Supply Mission** in Washington was responsible for placing India's case before the Lend-Lease Committee regarding Indian Government's requirements and procurement of all other stores to be paid in cash ordered by Government of India.

How the Department Worked.—The responsibility of the Supply Department commenced with the placing with it of a definite demand and its functions fell broadly into two main stages, planning and purchasing, dealt with by separate branches, working in the closest co-operation. The former branch was responsible for co-ordinating productive capacity in respect of particular items and planning production on the basis of demands. The extent to which the services of this branch were required varied according to the class of stores concerned. In cases where supplies were readily available from stock, Purchase Officers could usually proceed directly to arrange supply by means

of open, limited or single tenders or by negotiation. When, however, owing to the size or some other special feature of the order, *viz*, the shortness of supplies, or the fact that such commodities had never before been produced in India, special difficulties arose, the Planning Officer was on the job from the beginning, with his knowledge of available stocks and of the potentialities of local industry which were placed at the disposal of the purchase officer. The sources, or possible sources of supplies, having been determined or developed, the Purchase Branch took over the responsibility for arranging the actual contract either after calling for tenders, or after negotiation, in which again the Planning Officer was closely associated or by such method as, in the circumstances, appeared to be appropriate. The drawing up of actual contracts, arrangements for delivery in accordance with the indentors' directions and the like, all fell within the sphere of the Purchase Branch.

Concurrence of the Finance Department in all important items of expenditure was obligatory under the constitution. From the beginning, therefore, Financial Advisers were attached to the Supply Department at every level of the organisation and they remained in close contact with the Planning and Purchase Branches at each stage of any important scheme or contract. A staff of Cost Accounts Officers also worked under the general direction of the Joint Financial Advisers. They were responsible for the investigation of the costs of those contracts, the payment for which depended on the actual cost of production *plus* a percentage of profit. Finally, there was a Chief Controller of Supply Accounts whose organisation was responsible for the payment of all bills for supplies ordered by the Supply Department, and a Chief Controller of Army Factory Accounts for accounts work of Ordinance Factories.

The department maintained close contact with all the principal indenting departments of Government mainly the Defence Services through the Brigadier Provision, Co-ordination and Supply. Supply requirements were based on broad lines of strategy with which the Department was not concerned. It delivered its purchases at depots, and thereafter had no further responsibility for the use to which they were put. The Department had also close and important contact with other institutions operating in the same field. Among these were the Central Provision Office and the British Ministry of Supply Mission (successors to the Eastern Group Supply Council), the India Supply Mission in America, Lease and Lend Administration, the India Stores Department in Blackpool and the High Commissioner for India in London.

A Chart showing the organisation on V-J Day is given Appendix No. (i). A table showing the strength of the Department year by year and on V-J Day is also appended *vide* Appendix No. (xv).

CHAPTER XXVI

SUPPLY FINANCE ORGANISATION

In making a historical survey of the activities of the Supply Finance Department, it will be useful to begin with a brief description of the special position held by the Finance Department in the administrative machinery of the Government of India. Constitutionally, no department of Government of India can undertake any measure involving expenditure of Government funds without the approval of the Finance Department. Prior to the war this Treasury control was exercised in two ways. Every new measure involving expenditure of money was referred to the Finance Department with full details explaining its necessity, the proposed method of its execution and an estimate of its cost. The Finance Department examined whether the measure was essential and consistent with the broad Government policy and whether the proposed method of its execution provided for the maximum possible economy in expenditure. This part of the function of the Finance Department was known as "Expenditure Control". The spending of Government funds on the measure was, however, further restricted by the monetary allotments made with the previous sanction of the Legislative Authorities. This budgetary control had to be inevitably abandoned during the period of war especially, in the case of measures required for the urgent prosecution of the war effort. Nor was it possible to continue the expenditure control in a centralised office located in New Delhi. On the other hand, consideration of economy became all the more important so that there should be no undue waste of money and effort. For this purpose, a closer expenditure control was necessary.

As soon as the Supply Department was created, arrangements were made by the Financial Adviser (Military Finance) to deal in his office with all its financial business. He became responsible for financial advice or concurrence in all matters relating to the Supply Department. As the Supply Department expanded, frequent references had to be made to the Military Finance Department. Early in March 1940, therefore, the Military Finance Department appointed a whole-time Joint Financial Adviser to the Supply Department.

Before the war purchases, as a rule, were made by Open, Limited or Single Tenders and no officers of the Finance Department were attached to the Purchase Organisation (Indian Stores Department or Contracts Directorate). Competition was generally effective over most of the field and the open and limited tenders provided sufficient protection to the financial interests of Government. Contracts exceeding a specified financial limit were subject to the approval of Government. In the Contracts Directorate financial control conformed more closely to the general practice in the Defence Department.

Increasing demands made on the industrial resources of India as a result of the war rendered changes in the methods of purchase inevitable. Goods produced by India were required in much larger quantities than before. New articles had to be produced. These requirements indicated the necessity of closer control, but not necessarily of a statutory character, on the prices paid for Government purchases and of more intimate contact with industry. As a natural corollary, the open tender steadily gave place to settlement by negotiation with individual suppliers as well as with industries as a whole to limited and single tenders. Limited and single tenders are the most effective means of meeting urgent demands. Settlement by negotiation is the only means when new articles are required or the demands are so large as to absorb the entire or over-whelming proportion of existing capacity.

The main object of the Supply Department was to secure war supplies at reasonable and fair prices. It was, therefore, considered essential to accredit

Finance Officers to the two Purchasing Organisations. Meantime a post of Controller General of Purchase was created in the Main Secretariat and a Financial Adviser (Purchase) was accredited to him. Deputy Finance Officers attached to Contracts Directorate and the Indian Stores Department worked under his control.

The decentralisation of December, 1940, made the two Directorates (General self-contained units. This re-organisation brought the Purchase Branch into close contact with the Directorates General, and it was, therefore, no longer necessary or practicable to have Finance Officers separately for the Purchase Branches and the Directorates General. The posts of Deputy Finance Officers (Purchase) were accordingly abolished. A Supply Finance Branch of the Finance Department was formed with the Financial Adviser (Military Finance) as the *ex-officio* Financial Adviser of the Branch. An additional Financial Adviser was attached to the Main Secretariat and Joint Financial Advisers to the Directorates General with necessary Deputy and Assistant Financial Advisers. Provincial Organisations were established by July 1940 but the Controllers were not invested with independent purchase powers till about June or July 1941. About this time it was decided that purchase should be progressively de-centralised to Controllers. Deputy Financial Advisers were then attached to the Controllers in Bombay, Madras, Cawnpore and Lahore. The Calcutta Controller was to utilise the services of JFA(MP) while no Finance Officer was attached to the Karachi Office.

With the creation of a separate Purchase Branch in August 1941, an organisation was gradually evolved in which representatives of the Finance were closely associated with all important purchase action. This policy was followed throughout war and whenever any new organisation, *viz.*, DGSR, DGA, etc., was set up, Finance Officers were accredited to them.

The idea was to place side by side the three parts, Planning, Purchase and Finance, and that these Finance Officers should associate fully with the work of the executive organisations, tender financial advice on each measure from its very inception, take an active part in shaping the measure on sound financial lines and accord the approval of the Finance Department at the proper stage without undue delay or protracted investigations.

Duties and functions of the Finance Officers.—The Finance Officer concerned was consulted in arriving at decisions as to the action to be taken on indents requiring special action such as negotiations with an industry, allocation to one or more firms without calling for tenders, etc., and his concurrence in these decisions was necessary. Financial concurrence was also necessary when the lowest tender was not accepted and the difference in respect of any item between the offer proposed to be accepted and the lowest offer was in excess of five per cent. of the lowest offer or exceeded Rs. 1,000.

Financial concurrence was also necessary in the following cases:—(a) enhancement of contract rates; (b) claims for compensation; (c) any departure from contract terms having a financial aspect; (d) cancellation of contracts involving increased expenditure owing to re-purchases on Government account; (e) extension of the period of any rate or running contracts; (f) enhancement or reduction of the amount of any security deposited by firms or contractors; (g) Waiving of compensation for loss or inconvenience caused to Government owing to any breach of contract terms not necessitating or justifying the cancellation of the contract.

The proposals for the creation of additional posts and all other matters relating to the establishment and administration were referred to the Branch and/or Main Secretariat (according to the nature of the case) for examination from the administrative point of view. In case the Branch and/or Main Secretariat approved the proposals, they were referred to the Finance Officer concerned for his concurrence.

It must be understood that the Finance Officer's responsibilities as guardian of the interests of tax-payers were not limited to the specific cases in which he must be consulted under the rules. If he had reason to believe that public money was being wasted, it was his right and duty to intervene and he was entitled and required to obtain any information he might need for that purpose. This responsibility was shared by Purchase and Planning Officers and they were entitled to receive, and expected to obtain, from their financial advisers assistance and advice throughout their proceedings. The acid test for a case not required by rule to receive financial concurrence was whether the Finance Officer was likely to approve. If so, no reference need be made. If there was any doubt he should certainly be consulted. It was only by the closest collaboration at all stages that the main object of the Supply Organisations to secure war supplies at prices which were reasonable and fair was achieved to a large extent.

Re-organization of the Supply Finance Department.—The re-organization of the Supply Department commenced with the cessation of hostilities and the Directorates General of Munitions Production, Shipbuilding and Repairs, Supply and Aircraft were gradually wound up and two new Directorates General of Industries and Supplies and Disposals created. A similar re-organisation took place in the Supply Finance Department and the Finance Officers accredited to these organisations were gradually withdrawn. As the offices of the Controllers of Supplies were also abolished and there was no need in accrediting Finance Officers to the new Regional Offices, it was decided to close the offices of the Deputy Financial Advisers with the Controllers. At present an Additional Financial Adviser, two Joint Finance Advisers with necessary staff are accredited to the Secretariat and the two Directorates General respectively.

Cost Accounts Organization.—All contracts other than those entered into at competitive rates required in varying degrees an examination of the accounts of contractors in order to establish that payments charged in Government accounts were in accordance with contractual arrangements. This was particularly desirable in cost plus contracts. This necessitated the employment of Cost Accounts staff. The Supply Finance Department, therefore, established a small Cost Accounting Organisation and gradually enlarged it. The number of contracts, however, kept on increasing and it appeared beyond the capacity of any Organisation which Government could expect to bring into being. In view of these difficulties the following arrangements were made with the concurrence of the Auditor General:—

- (1) Auditors of Contractors might be employed as auditors on behalf of Government subject to certain conditions.
- (2) In all cases where prices were related to costs, actual or estimated, a brief statement outlining the system of cost accounts observed by the firms concerned should be prepared either by departmental accountant or contractors' auditors and kept on record for reference.
- (3) The checks to be exercised by the accountants, (departmental or private) should be laid down by Government.
- (4) In all important cases first checks should be applied by departmental accountants. On receipt of their reports Government should decide whether subsequent audits should be conducted by departmental accountants or private auditors.
- (5) Other cases could be entrusted to private auditors but the Finance Department must always be on the alert to pick up cases that should for any reasons be transferred to departmental accountants;

- (6) Reports of private auditors should be reviewed by departmental accountants.

Under these arrangements the duties of Government Cost Accounting Organisation were to deal with all audits classed as 'important' and to keep the work of private auditors constantly under review. Important audits were entrusted to private auditors when they became well settled.

As regards factories constructed and operated by private firms as agents of Government, Government decided that cases which did not require anything more than verification of facts might suitably be entrusted to the auditors of contractors. In other cases audits should be carried out by Government accountants till such time as all technical question regarding the basis on which common expenses should be allocated between Government business and the rest were settled. When the audits became routine and were reduced to the level of verification of facts, they might be assigned to the auditors of agent firms.

CHAPTER XXVII

SUPPLY ACCOUNTS, FACTORY ACCOUNTS AND AMERICAN PURCHASES ACCOUNTS ORGANISATIONS

The Supply Department is served by three accounts organisations—the Supply Accounts Organisation, and the Army Factory Accounts Organisation, and the Accounts Organisation for the Overseas Purchases. The first is headed by the Chief Controller of Supply Accounts in Delhi with branch offices at Delhi, Calcutta and Bombay each under a Controller and also the Controller of Coal Accounts at Calcutta. The Army Factory Accounts Organisation has four offices namely (1) Chief Controller of Factory Accounts; (2) Controller of Ordnance Factory Accounts; (3) Controller of Leather and Clothing Factories Accounts and (4) Controller of Accounts Military Railway claims. The head of the accounts organisation for Overseas Purchase is designated the Chief Accounts Officer (American Purchases). It has branch offices at Delhi and Calcutta.

The Supply Accounts organisation is responsible for all payments and accounting work in respect of contracts placed by the Supply Department with the trade or other Governments. As Chief Accounts Officer (American Purchase) is only an Accounts Officer and not a paying officer, it was arranged that all payments in connection with clearance, handling and storage of imported stores (both Lease-Lend and non Lease-Lend) should be made by the Supply Accounts Offices. For Special transactions where necessary, the Chief Controller of Supply Accounts can use the agency of Provincial Accountants General.

Originally the Audit Officer, Indian Stores Department was responsible for the audit and accounts of the Indian Stores Department while the Military Accountant General was the Audit and Accounts Officer of the Director of Contracts. The Audit Officer also dealt with the accounts of the Northern India Salt Revenue Department. In August 1939, this officer was designated as Chief Auditor, Indian Stores Department. When the Supply Department was created in September 1939, the Military Finance Department began to deal with the Finance side of the Department and the Chief Auditor with the accounts side. As the Department expanded the accounts and audit of the Deptts. Central Excises and Salt (late Northern India Salt Revenue Department) were transferred to the Accountant General, Central Revenues from 1st August 1940, so that the Chief Auditor could be free to deal with the payment and accounting of the transactions of the Supply Department only.

Prior to its transfer to the Military Accounts Department, the Chief Auditor's office was under the Auditor General. From 1st September 1940, this office was transferred to the Military Accounts Department and designation changed to the Controller of Supply Accounts. This transfer was made to facilitate the unification of the procedure connected with the financial adjustments between the Government of India and His Majesty's Government in connection with war expenditure under the Plan of Allocation agreed to by the two Governments.

Controller of Supply Accounts, Calcutta.—A separate branch of the office of the Controller of Supply Accounts under a Deputy Controller was formed in Calcutta to deal with the purchase of stores handled by the Directorate General, Munitions Production, with effect from the 2nd January 1941. The Accounts Office in New Delhi, however, continued to deal with the Directorate General of Supply and Main Secretariat.

From 31st August 1942, the Controller of Supply Accounts, Delhi was designated as Chief Controller of Supply Accounts and the Deputy Controller at Calcutta as the Controller of Supply Accounts.

Controller of Supply Accounts, Bombay.—To effect speedier payment to suppliers working against contracts placed by the Controller of Supplies, Bombay and Madras, and the Deputy Director General, Cotton Textiles Directorate, Bombay, a Branch of the office of the Chief Controller of Supply Accounts, New Delhi designated as the Office of the Controller of Supply Accounts was opened in Bombay in October 1942.

The Chief Controller of Supply Accounts' office at Delhi was controlling offices at Bombay and Calcutta; he was also in immediate charge of supply accounts office at Delhi. From 1st June 1944, he was relieved of the charge of the Supply Accounts office at Delhi and a separate office like the offices at Bombay and Calcutta was constituted at Delhi under a Controller of Supply Accounts. The audit and accounting of purchases from overseas was transferred to the Chief Accounts Officer (American Purchase) with effect from 1st April 1944.

When the Chief Auditor, Indian Stores Department was transferred to the control of Military Accounts Department; it was laid down that Controller of Supply Accounts would be *ex-officio* Joint M.A.G. In that capacity, he deals with the Finance Department (Supply) on all questions relating to:—(a) Conditions of contracts and procedure of payment of Contractor's bills, (b) Interpretation of orders issued by the Department of Supply, (c) Objections against orders of the Department of Supply and (d) Budgets of the Department of Supply.

The extent of audit check to be exercised by the Chief Controller of Supply Accounts is fixed by Finance Department (Supply). All questions relating to establishment, conditions of service, promotions, discipline and transfer, etc., are also referred to that Department. All references relating to Civil accounts are made to the Auditor General and those relating to Military Accounts procedure to the Military Accountant General. The three Controllers function both as Civil and Defence Accounts Officers. In relation to civil transactions the audit exercised by the Controllers is statutory audit, i.e., final. As regards Defence transactions, they act as Accounts Officers and the audit on behalf of the Auditor General of India in respect of such defence transactions is conducted by the Director of Audit, War and Supply. The three Controllers have separate direct exchange accounts with Civil and Defence Accounts offices and maintain two sets of accounts Civil and Defence.

As Accounts Officer of the Supply Department, Supply Accounts Office is responsible for the checking of its budget and preparation of its appropriation and finance accounts. The concurrent audit of the acceptance of tenders is also conducted by the Supply Accounts Officers of the Chief Controller of Supply Accounts.

Controller of Coal Accounts, Calcutta.—With effect from June, 1944, the functions in regard to the production and distribution of coal became the responsibility of the Department of Supply and the Coal Commissioner became a Supply Department officer.

To deal with the accounting transactions relating to the above organisation the Colliery Accounts Officer was designated as the Controller of Coal Accounts under the administrative control of the Chief Controller of Supply Accounts and of the Finance Department (Supply). The Controller of Coal Accounts functions as (a) a Railway Accounts Officer in respect of transactions relating to Railway Collieries; (b) a civil Accounts Officer in respect of the accounts transaction that may be entrusted to him.

Directorate General of Ship Construction and Ship Repairs.—A Directorate General known as the Directorate General of Ship Construction and Ship Repairs was created in May 1942. With effect from 1st November 1942, C.S.A.

Bombay was made responsible for the payment of pay and allowances, etc., of the personnel of the Directorate General establishment at Bombay and C.C.S.A. Delhi was made responsible for arranging payment of the staff of Directorate General at places other than Bombay and Calcutta. From 1st January 1943 C.S.A. Bombay took over from the C.N.A. the payment, accounting and audit of bills for stores purchased by the Directorate General as also bills for special works for expansion to ship repairing facilities such as the 'Mazagon Dock Extension Scheme', 'purchase of Plastic Armour', etc.

TIMBER

With effect from 1st October 1941, the work in connection with payment for purchase of timber through the Provincial Government and Indian States was transferred from the Controller of Military Accounts to Chief Controller of Supply Accounts. The work relating to pricing and adjustment of Issue Vouchers for timber issued from the Timber Depots to other Government Departments including Defence and private parties, etc., was transferred to the Chief Controller of Supply Accounts from 1st July 1942. The Chief Controller of Supply Accounts became responsible for the entire arrangements connected with the payment for supply of timber, accounts adjustment and local audit of initial accounts maintained by the Timber Depots except in the case of U.P., where a special procedure applied.

Accountants General and Comptrollers of Provinces began to act as Sub-Auditors to the Controllers of Supply Accounts, Delhi in respect of timber supplies to Supply Department from their provinces. This arrangement came into effect from 1st July 1944. Accordingly, the Accountant General/Comptroller of a Province became wholly responsible for the audit of all payments, whether in cash or by book transfer, made against contracts for timber supplies, saw-milling, etc.

For certain reasons, the system of accounting of receipts and issues of timber did not work quite satisfactorily. In order to improve the same and to ensure that all necessary records and vouchers relating to these receipts and issues were duly submitted by the various Timber Storage Depots to the Supply Accounts Office concerned to enable it to make necessary adjustments, a new organisation—Timber Supply Accounts—under an Additional Director in the Timber Directorate of the Directorate General of Supply with branch offices attached to Timber Directorates at Calcutta and Bombay was formed from 1st August 1945. This organisation was purely a departmental accounts organisation and was responsible for the initial and statistical accounts and for collecting and rendering to the Controller of Supply Accounts concerned all issue vouchers and inspection notes requiring adjustment. As a result, the work in connection with the payment of contractor's bills and of financial adjustments on account of supply of timber to various civil and War Departments, etc., indentors from the Timber Depots under the control of Department of Supply which was done in the office of the Controller of Supply Accounts, Delhi, was decentralised on a regional basis. The local audit of the initial accounts of the Timber Depots and Saw under the Department of Supply was also decentralised on a regional basis.

With the cessation of hostilities and consequent reduction in demands for timber, the timber supply operations had to be recentralised once again. The branch Dtes. at Bombay and Calcutta and the Accounts Branches of Timber Supply Accounts Organisation attached thereto were abolished with effect from 15th November 1945. Consequently, the accounting and payment work in the Supply Accounts Offices was also recentralised in January 1946. However, for the sake of convenience, the local audit of accounts of the Port Timber Depots has been allowed to be done for the present by the C.S.A. Calcutta/Bombay on behalf of C.S.A., Delhi.

2. On 1st December 1945, the U. P. Government took over the entire stock of Central Government Timber held in temporary storage depots in U. P. and

with effect from that date future production and supply of timber in U. P. are being controlled exclusively by them. Similarly, the Government of C. P. and Berar took over all the depot stocks of timber, ballies, etc., as on 31st December 1945. The Government of Bombay have also taken over, with effect from 15th July 1946, stocks of all serviceable timber in depots in that province, with the exception of stocks held at the Bombay Port and Ghorpuri depots. Stocks of unserviceable timber have also been taken over by that Government for disposal on behalf of the Central Government. The audit functions in respect of all supplies of timber made by the three provincial Governments against orders placed by the Department of I. & S. will be exercised by the provincial A.G. concerned on behalf of C.S.A. Delhi.

3. It was decided in July, 1945 that with effect from 1st January 1946, all timber in Government Depots which is surplus to the requirements of the Government indentors will be disposed of in future only under the orders of the Directorate.

PROCUREMENT OF PAPER

With effect from 1st April 1944, the responsibility for the development of paper production and its procurement was transferred from the Controller of Printing and Stationery to the Supply Department (through the Directorate of Paper in the Directorate General of Supply). As a result of this, payment to the Mills for paper supplied against Supply Department contracts became the responsibility of Controller of Supply Accounts, Delhi from that date. He is also responsible for effecting recoveries from Indian States on account of cost of paper supplied to them.

FOOD DEPARTMENT

Until the end of February 1943, Chief Controller of Supply Accounts was also responsible for the audit and accounting of work relating to Foodstuffs. With effect from 1st March 1943, however, a separate office of the Controller of Food Accounts was formed to deal with payment and accounting of bills and other transactions relating to the newly created Food Department.

Industries and Civil Supplies Department.—With effect from 15th May 1943, the Cotton Textiles Directorate was transferred to the Administrative Control of the newly created Department of Industries and Civil Supplies. Procurement of Cotton Textiles was taken over by that Department. This did not, however, involve any change in the accounting arrangements.

A comparative statement showing the strength of the Supply Accounts organisation and the work handled by it during the years 1940-41 to 1944-45 will be of interest and is given below:—

	Strength		Volume of work handled
	Gazetted	Non-gazetted	Amount of cheques issued in lakhs
1940-41			
1941-42	12	325	5,641
1942-43	24	754	13,873
1943-44	39	1249	24,253
1944-45	42	1304	29,069
	53	1598	39,301

CHANGES IN ACCOUNTS ORGANISATION AS A RESULT OF REORGANISATION IN THE DEPARTMENT OF SUPPLY

The Supply Department was re-organised early in 1946 and the Industries and Civil Supplies Department merged into it. The new Department was named as the Department of Industries and Supplies and the payments against orders issued on or after 1st April 1946 by the Regional Purchase Organisations of the I. & S. Department were centralised at C.S.A., Delhi. With the shifting of headquarters of D.G.A. and Aircraft Secretariat and abolition of the D.G.M.P. and C.C.P. (M.) at Calcutta, their work having been transferred to D.G. (I. & S.), New Delhi, the audit and payment of the officers and their staff was transferred to C.S.A. Delhi. The payments against contracts issued by the Textile Commissioner on or after 1st August 1946 have been centralised at Delhi. The Inspectorates of the I.S.D. have been transferred to the I. & S. Department from 1st August 1946 and as such the audit and payment work will be transferred to the Supply Accounts Organisation. It has, however, again been decided that the C.S.A.'s offices at Calcutta and Bombay will continue and payment work against contracts has been decentralised to them with effect from 1st January 1947.

The audit and accounting work of pay and allowances etc., relating to the Electrical Commissioner's organisation, consequent on the transfer of that organisation to Works, Mines and Power Department has since been transferred to the A.G.C.R.

The Directorate General of Shipbuilding and Repairs was closed down and the Director of Shipbuilding with headquarters at Bombay re-designated as Director of Shipbuilding and Repairs. As a result of these arrangements, the payment of shiprepairs bills on work placed after 1st February 1946 on R.I.N. and S.T.O. Account was transferred back to the Controller of Naval Accounts.

(b) **Factory Accounts Organisation.**—Before the commencement of the War, the Controller of Army Factory Accounts, Calcutta, was responsible mainly for (i) the preparation of Cost and Production accounts of the Ordnance (including the Clothing and Harness Saddlery) factories in India, (ii) making payments to the factories and the Inspectorates affiliated thereto on account of wages of workmen and pay, allowances of staff and contingent, etc., charges, (iii) the payment of all local purchases and that of central purchases only in respect of firms in the Bengal area including coal and coke purchased by the Chief Mining Engineer and (iv) payment of pensions to Military and Military Accounts pensioners in the Bengal area.

To each factory was attached an Accounts Officer with necessary staff whose primary concern was to prepare cost and production accounts of the articles manufactured and repaired in that factory and to compile cost accounts under the "stabilised on-cost system" showing cost under labour, material and variable and fixed overhead charges.

The factories were transferred from the M.G.O. to the Supply Department in August, 1940. New factories were set up and spare manufacturing capacity under private or public ownership was harnessed to the war work. The number of Government factories like the Hindustan Aircraft Limited, were financed by Government and employed on Government work. E.I.R. and other Railway workshops were taken for munitions production. The accounting and audit responsibilities in respect of the agency factories as well as the contracts and other orders placed on trade and Railway workshops was also entrusted to the C.A.F.A.

The C.A.F.A. first remained under the control of the M.A.G. (Military Finance Department) but from October 1943, it was transferred to the control of the Finance Department (Supply). As the organisation proved inadequate to handle the enormous volume of work, de-centralisation became necessary. The office was re-organised into three separate divisions each under a separate

Controller—Leather and Clothing Factories and the Civil Production Factories were placed under one Controller, viz., the C.L.C.F.A., the Ordnance Factories under another Controller, viz., the C.O.F.A. and the audit of Railway Warrants and M.C. Notes under one Controller, the C.A.M.R.C., all the three under the administrative control of the C.C.F.A. Later the Accounts Officers in different factories were given powers to issue cheques in payment of most types of bills hitherto paid from the Main Office at Calcutta. The work relating to the payment of all C.P. bills including those relating to the Bengal area which was dealt with by the C.A.F.A. in peace-time was transferred to C.S.A. in 1941.

Another serious difficulty arose in the accounting of the enormous stocks of parachute materials which in some cases were brought in by weight and issued in terms of so many yards per parachute. Again on account of elasticity and changes in temperature, the correct measurement of the material presented serious problems. In view of the huge quantities handled, considerable amounts of money were involved. Suitable weight length ratios were devised by Government in consultation with Textile experts and measuring machines were brought into use to replace manual measurements.

A separate section was formed in the Factory Accounts Office to deal with the accounting work relating to the Agency Factories and the Munitions Orders placed on the Railway Workshops and private firms. In view of the divergent and peculiar nature of the work pertaining to Civil Production, various new methods had to be devised in the matter of keeping accounts and several new types of Reports and Returns had to be introduced for the building up of the accounting structure.

Until March 1944, the C.C.F.A. was responsible for the maintenance of Block Accounts in respect of all Capital Assets created at Government expense in connection with the works the account of which was his responsibility. In March 1944, the responsibility of the C.C.F.A. in this respect was extended to cover a wider field in that he was called upon to maintain, from the very inspection, records of all assets which came under the control of the Supply Department and the cost of which was chargeable to Defence Estimates. Under this arrangement the office came to be associated with the question of maintenance of Block Accounts of Capital Assets for schemes handled by the several Directorates General under the Supply Department, as also the Food, Industries and Civil Supplies Departments, even though the accounting work in connection with those schemes was the responsibility of other Accounts Officers.

Early in 1945, the Local Audit of the Store Accounts of the R.E.D.'s Bonded Stores (Aircraft and M.T. Spares), Bonded Stores attached to Civil Maintenance Units and stores depots, Calcutta was specially entrusted to the Chief Controller of Army Factory Accounts although this type of work was not within the normal activities of the Factory Accounts Branch. There were six Repairable Equipment Depots, sixteen Bonded Stores for M.T. Spares, one Bonded Stores for Aircraft spares, fourteen Bonded Stores attached to C.M.U.'s and one D.G. (A.) stores spread over the length and breadth of India. The volume of work involved was very considerable in that to audit one quarter's accounts 1,300 man-days were required.

The C.C.F.A.'s work increased enormously and the organisation had to be expanded to cope with the work. From 11 and 430 on 1st August 1939 the number of officers and clerks rose to 180 and 6128 respectively on 1st August 1945.

(c) **American purchases Accounts Organisation C.A.O. (A.P.).**—The organisation of the C.A.O. (A.P.) was set up in 1941 to handle accounts matters connected with Lease/Lend stores imported from U.S.A. This was purely a departmental accounts organisation of the Department of Supply, the C.A.O. (A.P.) functioning as *Ex-Officio* Deputy Secretary to the Government of India,

Department of Supply. The routine of the organisation was on the lines of the Department of Supply with C.A.O. (A.P.) in the Main Sectt.; and two Deputies, one alongside the D.G. (S.), New Delhi and the other alongside the D.G.M.P., Calcutta.

Towards the end of 1941, the C.A.O. (A.P.) compiled a manual of Lease/Lend Accounts and issued other instructions for the guidance of controlling officers and the Dy. C.A.Os. (A.P.). These instructions were based on the assumption that the L/L stores would be ordered through the S.D., shipping documents would come to the controlling officers who would draw up Disposal Orders; the recoveries from private parties and book adjustments against Government consignees being initiated by the Dy. C.A.Os. (A.P.). the Supply Accounts Organisation carrying out actual accounting. Later on, however, it was found that the bulk of the L/L stores did not fall within the purview of the procedure prescribed above. These were mostly L/L stores required for the War Department which were indented for by its various branches, namely, M.G.O., Q.M.G., E.-in-C., and Naval Headquarters on the Secretary of State who met some of these demands from U.K. and diverted the rest to the U.S.A. The various branches of the War Department were accordingly asked to send the C.A.O. (A.P.), shipping documents of L/L stores through the appropriate Finance Officers to enable the C.A.O. (A.P.) to account for them. This device too did not meet with success.

It was also found that according to commercial practice shipping documents were being sent to the consignees direct. The India Supply Mission was, therefore, asked to send them to the Department of Supply. The distribution of shipping documents was undertaken by the C.A.O. (A.P.) till a separate Chief Shipping Officer was appointed. Ships manifests and Air Courier Statements followed and were given the same treatment. These documents, however, did not contain full information required for building up the accounts. Another difficulty which arose was that all stores were not uniformly marked as L/L either on the packages or the shipping documents. It was then decided to build up accounts on the basis of actual arrivals of L/L stores at ports. Port accounts offices were accordingly established in 1942 at Bombay and Karachi. Henceforward, emphasis was laid on building up accounts from port returns to be submitted by Dy. C.A.Os. (A.P.) in charge of these offices without depending on the information from the U.S.A. This basis too was obviously inadequate without American picture of shipments.

Ultimately, in January, 1943, the I.S.M. was requested to send out complete lists of stores shipped including those procured not only through I.S.M. but through other missions operating in the U.S.A. from the inception of L/L to which the I.S.M. agreed. These statements started coming regularly and the C.A.O. (A.P.) began to compile his accounts in the proper forms for submission to the F.D. (S.) and the M.F.D. The accounts of stores and services supplied to U.S. Forces in India by the Government of India under R/A was also compiled by the C.A.O. (A.P.) upto 31st December 1943, and submitted to the F.D. (S.).

The original idea of debiting all consignees was given up in the middle of 1943. Revised instructions were issued by F.D. (S.) regarding recoveries of the cost, etc., of L/L stores from paying indentors which included private parties, Provincial Governments, Indian States, Quasi Public Bodies, Railways and P. & T. Department of the Government of India. The system of issue of Disposal Orders and effecting recoveries from private parties was also perfected so as to remove the defects found in the light of actual experience gained by this time. This form of building up L/L accounts and the financial settlement in the case of paying indentors necessitated the separation of C.A.O. (A.P.)'s organisation from the Supply Department which materialised on 1st June 1943,

from which date the control of the C.A.O. (A.P.)'s Organisation passed from the Department of Supply to F.D. (S.) except the port accounts offices at Karachi and Bombay which, concerned as they were with the physical distribution of imported stores were retained by the Department of Supply. Subsequently, the functions of the C.A.O. (A.P.) were enlarged so as to cover the accounting of cash imports from Overseas countries as well, which work was being done by the Supply Accounts Organisation. The C.A.O. (A.P.)'s Office therefore, was constituted into a fullfledged accounts office (both Civil and Defence) with effect from 1st April 1944 for the accounting of imported stores exchanging accounts with other accounts officers in the same way as other Indian Government Accounts Officers do.

The termination of War brought to end L/L imports and so the need for accounting of L/L stores for which the C.A.O. (A.P.)'s Organisation was originally set up disappeared. From 1st September 1946, the post of C.A.O. (A.P.) has been abolished and his organisation has been merged in the Supply Accounts Organisation. The Offices of the Dy. C.A.O. (A.P.), New Delhi and the C.A.O. (A.P.) have been amalgamated with effect from 18th September 1946. From the same date, as a preliminary step towards eventual amalgamation of the C.A.O. (A.P.)'s Organisation with that of the C.C.S.A., the current accounting work of American Purchases done by the C.A.O. (A.P.) and accounts and audit of wholly L/L Stocks done by the Dy. C.A.O. (A.P.), New Delhi have been transferred to the C.S.A., New Delhi. The C.A.O. (A.P.), is thus left largely with only arrear transactions on account of imported stores which will take some time to be completely settled.

PART II

WAR SUPPLY PROBLEMS AND MEASURES TO DEAL WITH THEM

INTRODUCTION

It is not possible for the layman to comprehend the magnitude of the war supply problem. A war economy is a disrupter of the forces that prevail in normal peacetime. The assembly line in the plant is just as important as the front line. The demand for materials to feed the limitless consumer, known as total war, strains the economy of a country and has serious repercussions on the country's whole life. The war machinery is man and his equipment. In total war the equipment means all the resources of the nation, the armies, the navies, industry and agriculture. The navies, armies and air fleets of any nation, however, cannot function effectively unless backed by a gigantic "behind the lines" effort—effort of the great army of the industrial front. It is this army that prepares the major portion of the 60,000 different kinds of articles required by soldiers to fight in battle.

A shortage of one article may hold up the production of a hundred. "Bottle-necks" are many—raw material, plant and machinery, skilled labour, transport, price negotiations, inspection, delivery and any one of these may reduce the flow of supplies to a trickle. Each industry, nay, each factory may have its own difficulties. Yet unless these difficulties are overcome, the supplies may not be forthcoming. It is impossible for a nation with a free economy to shift overnight from the production of peacetime materials to the manufacture of war supplies without disrupting the prevailing price and production structure. Coupled with the physical problems of change-over from making products for peace-time consumption to war materials is the shortage of time allowed for the change. Plants must be converted and materials produced with utmost speed. Labour and other productive resources have to be directed from one line of production to another.

Dividing the subject SUPPLY into its two chief departments—planning and execution—it can be said that planning is always going on, in greater or less degree, even in periods of long and apparently undisturbed peace. Execution begins with a formal declaration of war. Thus, Supply partakes of at least two of those characteristics which are common to all the main branches of strategy. This formula applies to all countries which maintain defence forces, and peace-time activity in the field of Supply largely consists of the collection of data and its interpretation in terms of wartime military requirements. Apart from the creation of reserves of a limited range of goods and commodities, and the maintenance of production of those things manufactured in the Government's own Ordnance Factories, India's pre-war supply problem might be summed up as having consisted of ascertaining the country's probable requirements, its probable resources and their probable availability in time of war. It will be seen that the element of probability figured very prominently in an investigation of which at least a part had perforce to be of a highly speculative nature. Whilst the basic materials essential to armament making and supply could be fairly accurately listed, the extent and the scope of a possible conflict, or the speed at which it might develop could not be predicted with anything like the same assurance. Pre-war students of the problem could hardly have envisaged the early collapse of France or the celerity with which Japan advanced to the borders of India; shipping difficulties exceeded pre-war expectations rather than otherwise; the effects of bombing upon industrial output in the United Kingdom (to which India still looked for part of her supply of weapons) could not possibly be gauged with any accuracy. Examples of what may be called the imponderables in the situation could easily be multiplied. But uncertainty is the very essence of war and it is the unexpected that almost always happens. The foregoing roughs in, very sketchily, the background in which pre-war planning of Indian wartime Supply had to begin.

India was without adequate fighting equipment when the war broke out, but she gradually re-organised and geared her industry to war production. Combined planning, production, procurement and distribution were essential. Mobilisation and centralised directions were required. Production had to be boosted from virtually zero to many hundreds a month. It takes time to build a special purpose plant and get it into production. It takes time to ready a peace-time plant for production of war goods. India had to carry a production load not witnessed before.

At the outbreak of war, India possessed—

- (a) a nucleus supply agency staffed to an extent which could only cope with peace-time demands—Indian Stores Department, and the Contracts Directorate; and
- (b) knowledge of the potential capacity of the industries which then existed, but without indication of the demands likely to be made and the pace of development necessary to meet the requirements of the Defence Forces.

The investigations which had been undertaken at intervals during the previous few years had made clear the fundamental nature of some of the problems which the new organisation would have to resolve. The nature of the struggle in which the Commonwealth was involved, and in which for the period from the collapse of France until the entry of Russia into the war it stood alone, made it clear that India had to put forth her best effort. The extent and severity of the war at sea, which imposed severe limitations on the amount of shipping available threw India upon her own resources. The comparatively limited capacity of Indian industry and the fact that the more important technical stores had to be imported were the chief problems which the new organisation had to face.

The first effects of the war were to dry up the sources of supply of equipment normally available in peace-time. The countries from which in peace-time machinery, plants and all accessories such as jigs, tools and gauges could be obtained, together with the key personnel to run the machinery, restricted or prohibited their supplies. Apart from these, there were frequent serious difficulties about material and things which could be obtained quite easily in peace-time, but were subjected to a variety of war-time controls all over the world. Machines, machine tools and trained personnel were the most dreaded bottlenecks in the war production.

In the beginning, arrangement for supplies appeared plain sailing and the usual method of call of tenders was applied. As time went on, huge demands began to pour in and in case of certain industries, Government absorbed the whole of the capacity, thereby throwing the peace-time purchase machinery completely out of gear. Negotiation with industry had to be resorted to. The paramount necessity of carrying the industry with Government came to the forefront and it was realised that close understanding with industry was essential—in fact, the secret of success. The defeat of France and happening of events at Dunkirk with the Italian armies ready to march on Empire countries—Kenya, Somaliland and Egypt—completely revolutionised the strategy. India's munition making capacity had to be mobilised. The problem of supplying the necessaries of production—certain types of machine tools for example—in which India was deficient required careful study and the Roger Mission arrived in India.

A greater responsibility was thrown on Empire countries east of Suez for supplies of men and war materials not only by maintaining their own forces for internal defence but also supporting the vital garrisons in Egypt and Malaya as well as for helping the Empire in the Western Theatres of War. An Eastern Group Conference was held to pool the E.G. resources and its deliberations resulted in the establishment of an Eastern Group Supply Council, which placed large orders on India. It was no longer sufficient to place orders and rely on industry to execute them. Supply requirements

had to be planned for long periods in advance and a system of forward programmes was devised. The general needs of the nation had to be planned and frequently it was necessary to make provision for the supply of raw materials and labour, and to provide production plants. Above all, the requirements of various services and of the civil population had to be co-ordinated, a system of priorities had to be established and rationalisations had to be sought to obtain the most efficient use of available resources.

The civil markets of the country became denuded of stocks and India began to learn the meaning of total war with the result that Controls became the order of day, and had to be imposed to restrict use of strategic materials to essential needs. The military situation in the Pacific Area and in South Eastern areas underwent a great change and the entry of Japan gave a new re-orientation to Allied strategy. The urgent need to utilise India as a supply base came to the forefront and the necessity of developing as fully and as rapidly as feasible the industrial resources was emphasised. The decision of the United States to make available to the democratic powers the great resources of that country in equipment and stores and its extension to India was one of the heartening developments of the war and enabled the country to re-vitalise its production drive. The arrival of the American Technical Mission was most opportune and resulted in a basic change in production technique of engineering workshops and introduction of mass production methods. To meet increasing demands on the industrial resources of India, it became necessary to encourage expansion of existing capacity and to establish new productive capacity by adopting measures such as expansion of Government factories, increasing existing capacity by providing balancing plant or annexe, diverting surplus capacity of workshops to war production and tapping small scale or cottage industries for war supplies.

India is well known for dearth of skilled labour and it was not an easy job to provide for ever-increasing requirements of personnel for war plants. As production rose and demands increased, profits began to mount up very steeply and their control presented no small problems. Shortage of coal and transport were other headaches. The wants of the army in the field necessarily competed with the requirements of the civil community which in India far out-numbered those on active service. So, war gave rise not only to military problems but also to serious economic problems. Huge war expenditure in India by the Indian Government and the Governments of the U.K. and the U.S.A. led to inflation attended by all its evils. Drastic steps had to be taken to combat this tendency. The increased tempo of war production strained the civil economy to almost the breaking point. Diversion of orders overseas had to be sought and Hydari Mission was sent to provide relief to the civil economy.

How all these problems were tackled presents a fascinating story. The succeeding pages describe in some detail how the above problems arose and what measures were taken to deal with them.

CHAPTER XXVIII

EARLY WAR DEMANDS AND NECESSARY STEPS

The back-ground in which the pre-war planning of Indian war-time supply had to begin has already been described. In short, it may be stated that the investigations which had been undertaken at intervals during the previous few years had made clear the fundamental nature of some of the problems which the new organisation would have to resolve and the pace at which it might expect to effect even a partial mobilisation of India's resources. The nature of the struggle in which the Commonwealth was involved and in which for the period from the collapse of France until the entry of Russia into the war it stood alone made it clear that India had to put forth her best effort from the beginning. The extent and severity of the war at sea, imposed severe limitations on the amount of shipping available and threw India upon her own resources to an extent which could not have been anticipated in any pre-war calculations. If any defects were perceptible in the peace-time planning, these were that those who made the enquiries did not appear to have envisaged a situation in which India might be a large exporter of finished supplies or ammunitions, though they certainly recognised her importance as a source of supply of raw materials. The comparatively limited capacity of Indian industry and the fact that the more important technical stores had to be imported in the beginning, were the chief problems which the new organisation had to face.

Right at the beginning the Supply Department discovered that it could lay down no hard and fast rule, and that development must largely be a matter of evolution, plentifully interspersed with the processes of trial and error. The first year was a "desperate struggle to know what was wanted, having been told you had no time to do it in". India was without fighting equipment when the war broke out and had gradually to organise and gear her industry to war production. Production had to be boosted from virtually zero to many hundreds a month. There was no time to lose, no materials to waste.

The great difference between the first and second World Wars as far as the Indian Supply policy was concerned, was that whilst the late Indian Munitions Board practically confined itself to problems of purchase, the Supply Department had to regard production as an equally important branch of its activities. Commercial enterprise was encouraged to participate in the vast business of war production. The Department being responsible for production gradually equipped itself with an industrial planning organisation, whose duty it was to search out, create new sources of supply, develop and expand the existing sources. On the planning side, experts on the production of almost every class of material which was required had to be engaged. In many cases after the production of a particular kind of store had been planned, progress had to be controlled by experts who gave advice till such time as the article was in full production. In addition to planning the actual production of stores, the supply of raw material had to be arranged. Changes of specifications had to be made and substitutes considered.

The responsibility of the Supply Department commenced with the placing on it of a definite demand and its functions fell broadly into two main stages. planning and purchasing, dealt with by separate Branches working in the closest co-operation and with duties which could not be entirely separated. As demands began to pour in with the outbreak of war, it was realised that close understanding with industry would be essential. The Department, therefore, from the earliest days decided to associate Industry with its activities. The system of consultation through representatives of industry started with the creation of the Department and gradually grew and later on, in fact, became the

rule rather than the exception. A start was made with the appointment of a Liaison Officer (later on designated as Adviser) for Petroleum Products which was followed by such appointments for Woollen, Jute, Engineering, Cement and various other industries. The system promoted the closest possible contact between Government and the interests concerned and allowed the fullest and unfettered attention to be paid to the views and opinions of the industry in question.

In furtherance of the object of establishing and maintaining close contact with the Provincial Governments and the Chambers of Commerce and Industry, Controllers of Supplies were set up at Bombay, Calcutta, Madras, Karachi, Cawnpore and Lahore. It was also of great importance to provide a channel of consultation for mutual benefit and help with representatives of the major industries in the area in which the Controllers of Supplies operated and this was fulfilled by the constitution of Provincial Advisory Committees on War Supplies. In addition, Advisory Committees and Panels—predominantly non-officials—were set up to advise the Department in regard to the problems affecting a particular industry or section of the industry. The need for such close co-operation became more and more evident as the war progressed and called for the maximum co-operation of all classes of the commercial community.

For the first few months (from September 1939 to June 1940), the Supply demands made on India broadly fell into three main categories:—

- (a) the deficiencies in the production programmes of His Majesty's Government, various Dominions and our Allies. The Department was called upon to provide considerable quantities of certain articles that India was peculiarly fitted to manufacture. Under the former it shipped very considerable quantities of ammunition and lethal stores; the products of the Ordnance Factories. Under the latter were included very large quantities of such items as jute goods, blankets, boots, saddlery, various cotton textiles etc.;
- (b) to provide in the maximum possible degree the requirements for all Imperial Forces from the Middle East to the Far East. Under this heading there were a large variety of very substantial demands ranging from steel hangars for aircraft and armoured fighting vehicles to large quantities of tentage, food, clothing, etc.; and
- (c) to supply the needs for equipping the new Indian Defence Forces and the maintenance of the existing forces.

About June 1940, certain shortages appeared and it was felt that the limit of things which could be produced indigenously by the existing system and methods had been reached. Improved methods were needed to utilise the production potential. Executive machinery for the development of potential existed, but it required welding into a unified organisation designed to work on correct principles. Increasing difficulties were encountered when an effort was made to increase the varieties and numbers of new Indian production. An analysis of these difficulties showed that the production problems par-took of three essentially different classes. The first was giving no difficulties; the second and third must receive new treatment if progress was made that was within India's resources. In case of first type of articles we knew the shape, size and specifications and the manufacturers who could produce the articles satisfactorily by their own resources. In other cases it was a straightforward matter of finding industrial capacity. The second type of articles were such as could not be produced by the industry within their own resources. Examples were parachutes, glass substitutes, hot food containers etc. Development of such articles

could only be achieved by Defence experts and industry working in conjunction with the Supply Dept., assisting where required. Then there were other types of articles such as air-dropping containers, anti-gas fabrics, substitutes for tin-plate, plastics etc.; where the size, shape or nature of the article was not known. The Department only knew that a need for something to serve a particular purpose existed. Something had to be invented. Such problems could only be solved by Defence experts, technical and scientific research organisations etc., industry and the Supply Department in collaboration. Co-ordination of effort was necessary and the establishment of the Board of Scientific and Industrial Research, Supply Development Committee, co-operation with industry and strengthening of the Industrial Planning Organisation of the Department provided the solution.

Lists of articles which appeared to require scientific research for the initiation of the new industry and those in which scientific and technical help might place the failing industry on its feet, etc., were sent to the Board. For instance, there were heavy demands for hard woods and investigation of strengthening and hardening of wood by indigenous resins, impregnation and production of synthetic resins and insulation and corrugated boards etc., were suggested.

It must, however, be understood that for a year or so the war effort of the Supply Department was not more than to meet the *ad hoc* demands. The Department was, of course, not more than an agent and could only procure articles required by other parties but this position was disquietening and the Department was forced to adopt a new policy. The Department, for instance, wanted to know what the total strength of the Defence Forces was that it was required to equip and to make all arrangements for maintaining in say next two years. The imaginative organisation and meticulous assessment of needs for a year or two years ahead, always with provision for quick adaptation, if necessary, in a suddenly changing situation, appeared the only methods to fulfill the colossal undertakings in Supply. 'Long range' planning became the watchword and a system of getting "Forward Programmes" was evolved. So the Department could embark on broad-based and comprehensive arrangements for purchase and manufacture. The Department was naturally anxious to find new manufacturing capacity and expand existing capacity wherever possible and was determined to make in this country every war-like store which it could. If for any item the country could not produce the right thing, it wanted to produce the nearest thing to it that was possible.

CHAPTER XXIX

INADEQUACY OF TENDER SYSTEM—PURCHASE POLICY—ADOPTION OF NEGOTIATIONS—OTHER TYPES AND METHODS OF PLACING CONTRACTS

Before the war, purchases were made, as a rule, by **OPEN TENDERS** advertised in the daily press and trade journals. Other methods employed were (1) **Limited Tenders** in which case only those suppliers believed to be able to deliver the goods were invited to tender and (2) **Single Tenders** when only one supplier was invited to tender. This method was used largely for proprietary articles and rarely in other cases. On the whole the pre-war system may be said to throw up prices which were fair, reasonable and competitive. Instances could no doubt be given of bad bargains made by Government in peace-time, but broadly speaking the peace-time procurement of supplies and execution of works were not subjects of any anxiety.

In early days of the war, when the requirements of the Defence Services were small, it was still possible to rely upon competitive tendering to throw up reasonable prices. For instance, large requirements of cotton textiles were purchased in this way until the end of 1941. As more and more of the available capacity of each industry had to be absorbed for the Defence Services, this became progressively less satisfactory. There was very little scope indeed for the open competitive tender which not infrequently produced collusive tenders.

Moreover, certain disturbing elements become apparent during war-time. Government must have the supplies or execute the works in a very great hurry. The contractors tend to raise their prices in the hope that Government will agree rather than lose time in bargaining. There is a vast increase in Government demand and the effect of all these disturbances is to throw the peace-time machinery complete out of gear. Thus purchases were made under various system, mostly under limited and single tenders, as detailed below:—

(a) **Limited Tenders.**—The Department maintained registers of contractors by categories. Invitations to tender were normally issued to all contractors registered as competent to produce the store required. This method was used mainly for the vast range of miscellaneous engineering and general stores, which could be produced by the small contractors and where there still remained an element of competition, viz., buttons, badges, knives, forks spoons, scissors, hollow ware, padlocks, crockery, tables, chairs, etc. Even then the range of prices quoted was frequently so wide and the total capacity of all tenders taken together so little in excess of the total requirements that the Department was often compelled to enter into negotiations with tenderers for a modification of their quoted prices before placing firm contracts. They were guided in these negotiations by previous prices and by such estimates of the probable costs of production as they could prepare. However, the costs of small contractors working under primitive conditions were not only susceptible of close approximation but varied widely from contractor to contractor and from place to place. It was to this class of contractor (and Supply Department employed several thousands of them) that limited tenders were issued. They were seldom issued to what may be termed “organised industry”.

(b) **Single Tender.**—This method of purchase as understood in peace-time virtually disappeared. There were, of course, many stores for which Government had but one supplier and prices were settled with such suppliers by one of other methods described in the ensuing paragraphs.

For the products of “organised industry” different methods were employed. From the beginning of war the whole capacity of certain industries had to be

reserved for Government, and for their products it was obvious that competitive tendering would not do. The stores required had not previously been made in India—except possibly in Government factories under different conditions. Industry was thus not only unwilling but unable to quote firm prices. Contracts had therefore to be placed on a cost *plus* basis. Of these, by far the most important were the contracts for woollen textiles and for army boots. From time to time other contracts have had, for similar reasons, to be placed with other industries on the same basis. For example, India never before built Bassett Trawlers or "Z" Craft. India's shipbuilding firms were unable to frame a reliable estimate of the cost of construction, and even had they been able to quote a figure the Supply Department would have had no means of testing its reasonableness. So contracts for these vessels were originally placed on the basis of actual cost *plus* a profit of $7\frac{1}{2}$ per cent. of cost, but the final payment was made subject to a ceiling price. The policy was, however, for well known reasons, to avoid cost *plus* contracts and progress was sustained both in mitigating the ill effects of such contracts and in replacing them by more acceptable types. The only large straight cost *plus* contracts were the chassis assembly contracts with General Motors and Fords, the body-building contracts with General Motors, the aviation spirit lubricating oil and bitumen supply contracts with oil companies and the shipbuilding and Net Cost Emergency Repairs Contracts with shipbuilders and repairs. The modified cost *plus* contracts related to the chassis supply contracts with General Motors and Fords in 1941 and 1942, contract with Messrs. Cooper Allen & Company for the supply of Army footwear and the contract with the Indian Cable Company for the supply of cables and line equipment. Under the second type of contracts, prices were firm for a period of three to six months, but in fixing prices for the next price period, under or over recoveries made in the previous period were taken into account.

Apart from these, the variety of arrangements reached with organised industry was great. These arrangements all sought to apply, in some way or other the principle that a price was reasonable if it afforded no more than a reasonable profit to the producer over and above his costs of production. To do this effectively, however, Government must be equipped not only with a staff of cost accountants capable of ascertaining the actual costs of production of the various types of stores produced, but also with technical costs estimators competent to predict what the cost of production is likely to be in any factory under given conditions. The Supply Finance Department, therefore, built up a Cost Accounts Organisation, whose investigations were of great value. But the vast majority of Supply Department's contractors maintained no cost accounts. For such industries the only remedy was the technical cost estimator. Of these the Government of India had none.

The most convenient way of describing the types of contracts negotiated with organised industry would be to relate the history of Government's arrangements since the beginning of the war with one major industry and then to detail briefly the current arrangements in a few important cases. What follows should, however, be read in the light of the remarks made above.

Wool.—1939-40.—Contracts were placed on the basis of payment of actual costs *plus* a profit of $12\frac{1}{2}$ per cent. on cost.

1940-41.—It was agreed that each unit of the industry would prepare quarterly estimates of their cost of production in the ensuing quarter. With the addition of a profit of 10 per cent. on cost, they were to constitute the contracts price for deliveries in the relevant quarter. The certified estimates were to be checked by the Consulting Accountant to Government who was to advise whether the estimates had been properly prepared on the basis of the agreed schedule of admissible items of cost communicated to the industry.

1941-42.—The agreement for the year 1941-42 was that prices for each quarter should be fixed on the basis of the actual costs of production in the preceding quarter as certified by the companies' auditors. To the actual cost was to be added a profit, uniform for every unit, equal to $7\frac{1}{2}$ per cent., of the costs of production of the cheapest unit of the industry; for that item Companies' auditors were to work as agent of Government under direct instructions of Government in the extraction of the costs of production and their reports were to be reviewed by Government Cost Accounts Officers.

1942-43.—This arrangement worked as long as costs were steady or rising gently. But by 1942 costs had begun to rise more steeply and an arrangement whereby prices were fixed in relation to the costs of production in a period prior to the delivery period was claimed by the industry to be inequitable. From 1942-43, therefore, the arrangements provided for the payment of fixed prices calculated on the basis of the audited costs of production during the first half of 1941 adjusted every three months, according to an agreed formula, to compensate for variations in the level of wages, stores, fuel and wool cost. The profit margins were fixed at $7\frac{1}{2}$ per cent. of a fair average cost of production extracted from the audited actual costs of production in 1941 and stabilized at that figure for the duration of the war. The profit so frozen represented $6\frac{1}{2}$ per cent. on current cost.

1st April 1943 to V-J Day.—Even under this arrangement the cost levels chosen to determine the adjustments to 1941 costs were those obtaining immediately before the commencement of the delivery period and no account was taken of possible further increases. To this the industry again took exception. The 1943 contracts provided, therefore, for the re-imbursements of the actual expenditure incurred on raw materials, direct wages, stores and fuel, but the overheads and profits were frozen. The percentage of profit was reduced still further in 1944 and 1945 as a result of increases in production costs, otherwise the 1944 and 1945 contracts were practically the same. The value of woollen goods supplied to the Services from October 1939 to end of 1945 totalled approximately Rs. 51 crores.

In this history of Government's dealings with the woollen industry is to be found a number of important types of contracts employed. It also illustrates how the development of the cost accounting organisation, referred to above, permitted contract prices to be fixed in relation to ascertained costs of production. It further illustrates how rising prices forced Government into allowing more and more escapes in contract prices against increase in costs of production. Finally, it provides the most important example of a refund of excessive profits. Persistent probing into the basis of preparation of the certified estimates for 1940-41 finally established that they had been incorrectly prepared and this led to a total refund of Rs. 39,00,000 from various units of the industry. The only other important example was a refund of Rs. 11,00,000 from the most important producer of boots.

(a) **Steel.**—Soon after the outbreak of war a contract was concluded with the main producers for the supply of steel required for war purposes at prices equivalent to the then current imported prices. These prices were to apply for a period of six months from the 1st of October, 1939. "Thereafter and for the duration of the war" it was agreed that "prices for steel supplies should be determined anew by negotiations between the companies and the Government for every succeeding six-monthly period on the basis of prices for the first six-monthly period commencing from the 1st of October 1939, and that any increases or reductions in prices should be related to increases or reduction in the costs of production to the companies". Prices of items not included in the agreed schedule were left to be fixed by mutual agreement.

In all, about 3.5 million tons of steel estimated to cost Rs. 85 crores, were supplied to the Defence Services.

(b) **Cement.**—The cement supplies during March 1939 to August 1945 cost the Government about Rs. 17 crores. The contract during the year November 1942 to October 1943 provided for payment of fixed prices with the Cement Marketing Co., of India. From 1st November 1943 it was decided to provide for payment of a price fixed to include a certain profit per ton, the price itself to be varied during the year for variations in the cost of labour and materials. It also provided an "escape" against an increase or decrease in the incidence of overhead expenditure due to fluctuations in production. The basic price was derived from the actual ascertained costs of production in 1943. Price arrangements for 1944-45 also took the same form.

(c) **Jute Goods.**—Government contracts for the supply of jute goods were allocated to individual mills by the Adviser on Jute Supplies, who was also the Chairman of the India Jute Mills Association. Prices were fixed on the basis of the market prices of raw jute on the date on which the orders were placed plus an average manufacturing cost plus a profit of $7\frac{1}{2}$ per cent. on these two items plus the usual $2\frac{1}{2}$ per cent. managing agency allowance. If the delivery period extended beyond three months from the date of the contract, the prices so determined were varied once in three months to take account of fluctuations in manufacturing costs. The element in the price for raw jute, however, continued unaltered until the contract was complete.

(d) **Timber.**—The value of timber supplied to the Defence Services amounted to about Rs. 37 crores. The supplies were obtained from all parts of India through the agency of Provincial and Indian States Forest Departments. Before the working season, the Supply Department drew up a schedule of rates for each area in consultation with these agencies who were then authorised to make purchases for Government upto the quantities and at the rates agreed upon. The current schedule was based on pre-war prices adjusted to estimated increases in the cost of extraction. The schedule was enforced partly by the rigid movement control exercised by Government and partly by the adoption of pre-emption sale method, i.e., when a forest coupe was auctioned, the successful lessee was required to sell the timber to Government at rates notified before the auction. These rates were fixed on the basis of the royalty which the Provincial Forest Departments expected to get on the timber, a reasonable cost of extraction and a fair profit to the lessee.

The Supply Department generally placed contracts to cover six months' requirements at a time although contracts for longer periods could be placed if necessary. All contracts of value more than Rs. 25,000 for delivery beyond a date six months after the date of the contract included a 'Break Clause'. All the major contracts mentioned above included this Break Clause with the exception of cement and motor spirit. These contracts were not for a given quantity but for an agreed price. Government had no quantity commitments and consequently a 'Break Clause' was unnecessary.

CHAPTER XXX

CONTROL OF PRICES AND PROFITS IN WAR SUPPLIES.

The main object of a supply organisation is to secure supplies at prices which are reasonable and fair. In peace-time, the supplies required by Government are obtained in a more or less leisurely manner by a number of routine methods commonly known as open, limited and single tenders. The same principles apply to the execution of works and on the whole the peace time system may be said to throw up prices which are fair, reasonable and competitive.

For the above reasons, no officers of the Finance Department were attached to the peace-time purchase organisations, *viz.* Indian Stores Department and the Contracts Directorate. The open and limited tenders provided sufficient protection for the financial interest of Government.

With the outbreak of war, certain disturbing elements were at once apparent. These were—(a) the known fact that Government must have the supplies or execute the works in a great hurry and would, therefore, close with contractors sooner than lose time in bargaining; (b) dislocation of ordinary business—rise in prices of plant, labour and raw material; and (c) vast increase in Government demand so much so that in some industries it absorbed the whole of the peace-time capacity. The effect of these disturbances was to completely falsify the theory that by advertising an invitation to tender fair prices can be got.

Thus demands made on the industrial resources of India as a result of war rendered changes in the methods of purchase inevitable. Goods were required in much larger quantities than before. New articles had to be produced necessitating the creation of new sources of production or the diversion of existing sources to new items of supply. Deliveries according to schedule and the maintenance of adequate standards of quality were essential to the prosecution of the war. These requirements indicated the necessity of closer control, but not necessarily of a statutory character, on the prices paid for Government purchases and of more intimate contact with industry.

Government had to take action if quotations appeared unreasonable. There were certain statutory powers, but the commonest and most fruitful methods of bringing prices down to a reasonable level were first to find alternative sources of supply and secondly negotiation. The first method was particularly useful when the supplies required, or the work which was to be executed, did not demand a large expenditure of capital. For example, during the second world war it was possible to expand fairly rapidly the capacity for making tents and the wooden bodies of vehicles. There was no doubt that by expanding capacity, Supply Department were able to secure far more favourable prices than would have been the case had it limited the orders to a few well established firms. The second expedient, *viz.* negotiation, was useful when a high percentage of an industry's capacity for a particular item was booked. The procedure was to get the prospective suppliers concerned round a table and to attempt to arrive at prices which were satisfactory to both parties. The idea was to arrive at firm prices which could be paid without further enquiry or scrutiny of accounts. It was frequently necessary to resort to "cost plus" contracts. The supplier was offered a price based on cost of production *plus* a percentage profit and arrangements were made to check his accounts so that the cost of production could be accurately ascertained. The rule generally adopted in the department was that the profit should not exceed ten per cent. of the cost. The policy, however, was to use such contracts as stepping stones to fixed price contracts. Control over cost element in prices was, however,

attended with great difficulties and the constant appearance in Government contracts of "escapes" against cost increases was symptomatic of them. In fact, it was this difficulty that prevented the widest use of fixed price contracts and largely dictated the type of contract employed. Attempts to establish fixed prices were not always successful. However, prices were continually revised in the light of experience gained—and profits earned—and a certain amount of amicable re-negotiation of contracts took place when profits proved too high, resulting sometimes in refunds but more often in lower prices for the future. Endeavours were made to allow for previous excessive profits in negotiating renewals of contracts. Cost investigations were carried out by the Cost Accounts Organisation which was a part of the Supply Finance Organisation. At every stage of Supply, from top to bottom, there were stationed at the side of all departmental heads, from Directors-General down to quite small functionaries, a cordon of financial advisers, who as guardians of tax-payers' money ensured that the profits allowed and prices paid were reasonable.

When expansion of capacity or settlement by negotiations proved impossible, the Government exercised certain powers under the Defence of India Rules. These powers, however, were not found of special value in the field of war supplies, because their exercise involved action on a very wide and indeed on an all-India scale.

Supply problems generally arose in relation to two different classes of supplies—(a) supplies which were manufactured for Government; and (b) supplies which were in existence with a stock-holder and merely had to be obtained from him. To take class (a) supplies first, when ordinary executive methods failed, it made use of Rule 81(2)(c) of the Defence of India Rules, and of the "Undertakings (Charges and Accounts) Order, 1941". Under these provisions, the Government could require any undertaking carrying on any trade or business which was engaged in or capable of doing work which in the opinion of the Central Government was essential for war purposes, to do work of a particular kind, and the charges for such work were to be fixed by agreement, or failing agreement, by the order of an authorised officer. Should this power to dictate prices subject to an appeal prove insufficient, the Central Government could under rule 81(3) of the Defence of India Rules take control of an undertaking, but this was seldom resorted to. When control was assumed, compensation was payable either under rule 96 of the Defence of India Rules or under section 19 of the Defence of India Act.

Turning to class (b) supplies, it was possible, under rule 83 of the Defence of India Rules, to compel persons who were believed to hold stocks to declare what stocks they held and to prohibit sales pending further orders. It was also possible to requisition stocks at prices fixed by the Central Government. The difficulties in the use of these powers were that unless stock-holders were known with reasonable accuracy, Demands for information were likely to be evaded, and that if the intention to requisition leaked out, stocks went underground. Demands for information were, however, frequently made, and requisitioning was resorted to with some success. The broad principle was that the owner of requisitioned supplies received either what he paid for them himself plus a reasonable sum to cover interest and overhead charges or the current market price whichever was less.

Controls statutory or informal had to be introduced over the prices of raw materials or finished goods required by contractors wherever this was administratively feasible. Exports and imports were also brought under strict control. Controls were also established over production and distribution of several principal commodities in short supply, such as Iron & Steel, Machine Tools, Non-ferrous metals, Cement, Rubber and Cotton textiles. Controls operated in different ways but the main principle was to see that the stores were used only for essential war purposes including essential civil needs.

Speaking very broadly, the industry in India undertook the supply of goods and services required for the war mainly with a profit motive. The psychological aspect of working for the war effort was at best a matter of secondary importance. Just before the war, the private enterprise in India had passed through a prolonged period of a severe economic depression and in organising supply of goods and services for the war, many industrialists saw opportunities of making good some of their old losses. Certain others found this to be a suitable opportunity to start a new enterprise of post-war value or to consolidate their position in the probable competitive era of the post-war period. On the other hand, the pressure of war demands on India's limited and inadequately developed resources and the virtual stoppage of imports led to a scarcity of goods required for the civilian markets. The controls over prices for consumer goods for the civilian market took time to make themselves felt and meantime the profit margins on production for the civilian market had already become highly lucrative. The attitude of the industry was consequently one of indifference to the supply of goods and services of the war and although various measures were brought into being to stimulate and maintain a high level of supplies for the needs of the war, the purchasing activities of the Government had to be carried out in a predominantly seller's market. In short, it may be stated that the practical method of control of prices and profits that were followed both for supplies and for workings in the war supplies field were:—

- (a) executive action to expand capacity or to negotiate reasonable prices;
- (b) in the case of supplies which were manufactured or work which was done to order, statutory compulsion to manufacture the supplies or to the work at a reasonable charge;
- (c) in the case of supplies already in existence, the use of Demands for Information coupled with orders freezing stocks and followed by orders of requisitioning at prices fixed by Government; and
- (d) strict control over important raw materials, *e.g.* chemicals, zinc oxide, iron and steel, etc., and then releasing them for war supply contracts at reasonable prices.

CHAPTER XXXI

COLLAPSE OF FRANCE—ROGER MISSION—EASTERN GROUP SUPPLY CONFERENCE AND COUNCIL—MINISTRY OF SUPPLY MISSION.

If India was to make her maximum contribution to victory, the Indian Supply structure must fit neatly into its proper place in the grand economic and military design of the United Nations. Soon after the outbreak of war, it was obvious that the role of India's Defence Forces in a future war would have to be changed in the light of the increased mobility and extraordinarily developed striking power of modern armies from one of protection of India's frontiers alone to that of defending such strategic points outside India as might become her external bastions. Projects to achieve this were formulated in 1939 even before the war. Prior to the outbreak of war, several Ordnance Factories already existed in India for the production of munitions proper. These included a Metal and Steel Factory, a Gun and Shell Factory and other factories for the manufacture of rifles, gun carriages, cordite and ammunition. The only pre-war enquiry that was carried out was by the Chatfield Committee. Thereafter came the Roger Mission. After that the chief landmarks were the Eastern Group Supply Council, Lease/Lend and the United States Technical Mission to India; all these constituted important new points of departure, and it is necessary broadly to examine what each did to solve the production problems facing India and to help her war effort.

The Chatfield Committee concerned itself almost exclusively with the expansion and modernisation of the then existing ordnance factories and the setting up of additional establishments for the manufacture of high explosives. The entire capital expenditure of this programme worked out at approximately Rs. 7 crores and was borne entirely by H. M. G. The Chatfield Plan led to an expansion of output by 20 per cent. in Ordnance Factories owing to the addition of more plant and machinery. Soon after the declaration of war, further additions were made to the original scheme in order to facilitate the production of small arms and ammunitions. Typical of the Chatfield recommendations were the installation of three new shell-forging presses at an Indian ordnance factory as the first stage of a wide shell-forging expansion programme which enabled the production of finished cavity forgings for several types of high explosive shells in India, including 25-pdr. 3.7" anti-aircraft and 3.7" howitzer. It represented the first and most obvious step towards the complete mobilisation of India's munition-making capacity. For, if Government's own establishments, to which it looked for the irreducible minimum of its munitions requirements, were not, in fact, yielding the maximum output of which they were capable, there was very little sense in exploring other means of production, which was the main task of the next investigation, namely the British Ministry of Supply, or Roger Mission, which visited India in the autumn of 1940. The Chatfield Committee's principal recommendations were implemented by the end of 1941, and almost all the schemes were in full production by then.

The crux of the situation which confronted the Roger Mission was how best the production of munitions in India might be accomplished. In the phraseology of an official communique issued at the time, the Mission was "the fruit of consideration given by the Ministry of Supply, the India Office, the Government of India and the War Office to the question of the most effective steps that could be taken to expand the production in India of munitions and the other stores required by the forces". The Mission was charged with the general object of enabling India not only to meet her own needs for her defence, but to make an even greater contribution to the general war effort of the Empire, and in particular to enable her to equip and supply the forces in the Middle East and East of Suez. The Mission was to keep H. M. G. in close touch with Indian problems

and requirements, and to advise both, them and the Government of India as to the most useful action to take in order to assist India in increasing her output. Sir Alexander Roger, the Chairman of the Tank Production Board, Ministry of Supply, London, was the Head of the Mission and the Mission consisted of six other members composed mainly of business executives, who in turn were assisted by fourteen technical experts, some chosen from such places as Woolwich Arsenal. They were a well-balanced and selected team chosen for their expert capacity to judge the practicability of establishing new production in India, or the desirability of enlarging existing concerns. Upon these two main propositions hung a number of lesser ones. The problem of supplying the necessities of production—certain types of machine tools for example—in which India was deficit, had to be studied. These were necessary for the manufacture of a long list of the implements of war. What articles of equipment could best be produced in India, what she had best import, what share of the available supplies from foreign countries, and of the exchange necessary to purchase them could be allotted to her? All these and many other things comprised the formidable enquiry which the Mission undertook with expedition and vigour. Except at intervals and to prepare and present its report, the Mission rarely functioned as a whole. It worked in groups chosen for their knowledge and experience of the main heads of industrial production. By the early summer of 1941, its work had been completed, a report prepared and presented to Government. The result of the visit was an expansion and more rational integration of production as between India and other countries of the Commonwealth. Many projects such as projects for expansion in production of alloy steel, forgings for guns, manufacture of bayonets, loose barrels for A.A. guns, manufacture of Howitzers and of anti-tank guns, manufacture of shells and mortar bombs etc., production of cordite and several new factories for light machine guns, toluene and motor benzol, a filling factory and a new factory for the manufacture of optical and fire control instruments etc., were recommended by the Mission and its recommendations were accepted by Government. All these projects involved a capital expenditure of more than Rs. 12 crores. It may, however, be recorded that the successive stages of planning, i.e., the projects recommended first by the Chatfield Committee and later by the Roger Mission, were sufficiently logical and symmetrical ultimately to merge into one another. For instance, a large part of the modernisation proposals for ordnance manufacture were later dovetailed into certain Eastern Group projects.

Whilst the Roger Mission was in India, the Eastern Group Conference which authorised the setting up of a permanent Eastern Group Supply Council was held. The event was unique in the history of the Empire, which at that time was searching for a closer alignment of its economic resources: for Russia was still outside the struggle, and President Roosevelt was only able to carry the American people by short and uneven steps towards a policy of aid for the Allies. Individual Commonwealth countries had each of them stepped up the tempo of their war production, and increased the range of goods produced. But hitherto there had been little attempt to co-ordinate production and distribution to the best advantage. Such a process was clearly desirable in the interests of sound strategy, and it was obvious that India placed as she was athwart the main highway to the East and the Antipodes, was the ideal venue for this important gathering of the Commonwealth clans. There was the further fact that the Conference would be able to take advantage of the presence of the Roger Mission in the country to reinforce its deliberations. Accordingly, there met in Delhi in October 1940 representatives of the Government of India, the Commonwealth of Australia, New Zealand, the Union of South Africa, Southern Rhodesia, Burma, Malaya, Hong Kong, Ceylon, Palestine and the East African territories represented in the East African Governor's Conference. The object of this Conference was not a general economic discussion, but the settlement of a joint war supply policy for the Eastern Group, under which the maximum use could be made of the existing and potential capacity for war supply of each participating

country. The deliberations of the Conference were limited to war supply problems including the essential needs of the civil population of any participating country where they constituted a war supply problem. Obviously it was impossible for the conference to range over the entire commercial and economic field, for the object in view was to settle quickly the measures necessary to co-ordinate the war effort.

Empire countries, other than India in the Eastern hemisphere were also manufacturing a large number of articles required by the Armed Forces. It was, therefore, highly probable that by the autumn of 1940 there was already some duplication. Some of the participating countries, if assured of large orders, were able to produce articles which were neither manufactured in the other participating countries nor obtainable by them from abroad. A joint policy of planned and co-ordinated production alone could clearly overcome such difficulties. This was necessary if wasteful competition and duplication under economic conditions were to be avoided. For example, if all these countries concentrated on the manufacture of khaki drill, the war effort in the Eastern hemisphere was likely to be diverted into channels of over-production of one material to the exclusion or under-production of other items equally vital. Under a sound economy, a country produces an article for which it enjoys maximum advantages in respect of location, supplies of raw materials, manufacturing capacity, skilled labour and quick and cheap transport.

From the beginning, it was hoped that the Conference might result in the establishment of a standing committee representative of the participating countries, whose duty it would be to see that the decisions of the Conference were carried out. The Conference came to the conclusion that if the resources available were to be fully utilised, a Central Co-ordination Authority was necessary and suggested the establishment of the Eastern Group Supply Council. The Council was created on the 14th February, 1941, with representative of each of the three Dominions in the Eastern Group, and of India. Its Chairman was the representative of the U. K. Its main functions were the collection of information from E. G. countries regarding resources and capacity, the handling of requests from Group countries for assistance in procuring stores in short supply in their own countries, investigation of the possibilities of supply from the Group of articles required by the Indian military authorities for internal needs and for the maintenance of troops in the Middle and Far East for which they were at that time responsible, and the transmission to Group countries, for their acceptance, of orders for supplies arising out of these enquiries. The types of stores with which the Council would deal was also indicated. The Council began to function on the 31st March 1941. A Central Provision Office was designed to undertake the provisioning of troops in the Middle and Far East, and the co-ordination of those military demands from Group countries which could not be satisfied from indigenous production. In the early months of its existence, the transactions of the Council were mainly confined to dealing with orders on behalf of the Supply Departments of Group countries, the consideration of various problems relating to E. G. Supply referred to it by H. M. G. and Member Governments and the development of the Council's organisation and procedure.

Before the establishment of E.G.S.C. the intending authority, whether H. M. G. or Mid-East or the Far East, placed their demand on the country which they thought could best implement it. As often as not, such a demand was placed on India, and if she could not produce the article at all, or not in sufficient quantities, or not up to the required specifications, there followed a hunt round other Empire countries. This resulted in waste of valuable time, and led to conditions of supply which can fairly be described as living from hand to mouth. With the establishment of the Central Provision Office—an essential

-adjunct of the Council—all this changed. On its establishment in March 1941, India submitted for the Council's examination the outstanding demands on her for the many thousands of articles which were included in the term war supplies. She indicated at the same time the extent of her capacity in respect of each, and asked the Council for instructions as to the allocation of these demands. In allocating such demands the main considerations which influenced the Council were, ease and speed of supply with price entering into consideration but subordinated to these two all-important factors. Owing to her central geographical position in relation to the theatres of war outside Great Britain, India always held a position of dominating advantage.

The loss of Malaya, Burma and the Netherlands East-Indies, U. S. Australia co-operation in the defence of the Commonwealth against Japan, and the dislocation of certain trade routes between India and other countries in the initial stages of the war in the East ultimately served to rob the Council of some of its early strategic significance. For all practical purposes, by the middle of 1942, the Council had become dependent for the bulk of its supplies upon two members of the group, viz., India and South Africa. A Commonwealth Supply Council consisting of representatives of all countries in the Commonwealth (except Canada) and the heads of those British Government Departments concerned with Supply was established in London with one of the principal functions to collect information concerning military and civil requirements and picture of the Commonwealth's deficiencies—in order to present a co-ordinated picture of the Commonwealth's deficiencies to the C. R. M. B. In other words, the Commonwealth's deficiencies were to be met from the U. S. A. and the new machinery was intended to ensure that the demands were not presented to the U. S. A. in a piecemeal and un-coordinated fashion. As the Dominion Governments represented on the Commonwealth Supply Council were all located in the E. G. area; it followed that the functions of the new body would to some extent overlap with the functions already being performed on behalf of these very Governments by the E. G. S. C. Ultimately in February 1943, it was decided that the Council as then constituted should be wound up, and that its functions of allocating orders should be taken over by the Central Provision Office with a British Ministry of Supply Mission working in close collaboration. The Council was finally wound up on April 15th, 1943.

All orders placed by the Council could be classified into two categories—munitions and non-munitions. During the two years of its existence the Council placed orders for non-munitions items on Group Countries amounting to £173,500,000. Of this £121,800,000 represented orders placed for delivery upto the end of 1942 and £51,700,000 for delivery in 1943. India's share of the 1942 orders amounted to £73,700,000, the remainder going principally to South Africa and Australia. Indian orders in 1943 amounted to £44,400,000, the remaining mainly going to South Africa. India was the sole supplier of cotton textiles, jute and jute products. She accepted orders for over 95 million garments in 1942, more than 308 million yards of various kinds of cotton cloth, nearly 15 million yards of various types of netting and nearly 63 million articles of minor stores such as tapes, ribbons and badges. India also accepted orders for over 44 million lbs. of raw jute, 250 million yards of jute cordage and rope, about 500 million yards of canvas, 40 million canvas bags, covers and haversacks and over 4 million canvas tent components. India also accepted orders for 2 million items of harness and saddlery, nearly 3 million articles of wooden furniture, over 10 million wooden boxes and about 23 million small wooden articles such as tool handles, wooden components of tents and similar stores. She was also the principal supplier of leather products, and accepted orders for over 14½ million leather articles such as tool bags, cases and holdalls.

CHAPTER XXXII

LEASE-LEND AND RECIPROCAL AID

From the date almost of the outbreak of the War, the financial relations between the belligerents and the United States of America had been governed by the terms of the Neutrality Act of November 4, 1939. Whilst the Act did not prevent the supply of munitions of war to the belligerents, it did embody the principle of what became known as "Cash and Carry", that is, it prohibited the supply of materials by means of borrowing operations and made the transfer of ownership a condition precedent to the removal of the goods in question. Thus essential supplies had to be paid for in cash and the Allies were obliged to transport supplies in their own ships, at any rate so far as the European zone of operations was concerned.

At the beginning of 1941 it was realised that the dollar resources of the British Government were getting exhausted and that if Britain was to maintain her striking power, it was necessary to assure her that the supply of munitions and equipment would be steadily augmented. It was this realisation that led to the passage of the Lease-Lend Act by the United States Congress on 11th March, 1941.

The name under which the Act became known was derived from its working, which authorised the President "to sell, transfer title to, exchange, lease, lend or otherwise dispose of "Defence articles". Its statutory title was "An Act to Promote the Defence of United States". Under the Act, the President was authorised by Congress "in the interest of national defence" to procure and provide "defence articles" and "defence information" for the government of any country whose defence he considered "vital to the defence of the United States". The Act provided that "the terms and conditions under which any such foreign government receives aid shall be those which the President deems satisfactory, and the benefit to the United States may be payment or repayment in kind or property, or any other direct or indirect benefit which the President deems satisfactory".

In his Report to the 78th Congress on Lend-Lease Operations (March 11, 1941, to December 31, 1942), Mr. Edward R. Stettinius, Jr. Lend-Lease Administrator stated "Lend-Lease" is not a loan of money. Nor has it ever been an act of charity. The lend-lease programme of providing goods and services to nations resisting the Axis aggressors was undertaken for the Defence of this country and has been carried out in the interests of the people of the United States. We have aided other peoples under lease-lend because their interests coincided with our interests".

The Executive Authority for the Government of the United States of America charged with the general administration of Lease-Lend was the office of Lease-Lend Administration, later on named as U.S. Foreign Economic Administration. The President, however, retained the authority to determine what Nation would receive aid under the Lease-Lend and he determined all major policies. Every country that made a requisition for any goods had to satisfy the following main considerations:—

- (a) The L-L requested must be for a use essential to War or defence effort of the country.
- (b) Lease-Lend funds must be available to supply the requested aid.
- (c) The requested aid must come within the legal scope of the Lease-Lend Act.

(d) The defence aid requested must not be obtainable as a practical matter by payment in American dollars or other currency available to the requisitioning country.

(e) The requested aid must be of the most economical and efficient type suitable for the intended use.

As the war began to extend, India with her vast resources became the main reservoir of supplies for the entire war zone extending from the Mediterranean to the Pacific. In spite of her natural resources, India's actual production of many of the war supplies was largely conditioned by her ability to secure certain essential materials like plant, machinery, machine tools and finished steel from the U.K. and, still more, from the U.S.A.

When the procurement of these supplies from America was facilitated by the extension of the Lease-Lend Act to India, Government decided to set up their own agency—India Supply Mission—in the United States for obtaining vital supplies. Lease-Lend goods for India were ordered—(a) by the Defence Services through London; (b) by the Supply Department through London; and (c) by the Supply Department directly on Washington. As regards (a), if the Defence Services ordered, say, tanks or guns, they had no idea where they were coming from, and the value of the goods actually ordered on Lease-Lend was, therefore, not known. Under (b) for things such as Machine tools and non-ferrous metals the U.K. Controls operated. Here again, India placed her orders on London and did not know whether they could be satisfied in the U.K. or in the United States. Under (c), fell a considerable volume of orders for materials such as steel, chemicals, industrial equipment, and so on.

Demands on Lease-Lend were far more than the U.S. authorities could possibly satisfy and so a very severe preliminary shifting process was established in indenting countries. In India the Supply Department assessed each application for assistance under Lease-Lend, before passing it on to Britain or the U.S.

When individual applications had satisfied the consideration (a) and (d) mentioned above, departmental policy was framed, keeping in view the fact that orders must avoid unnecessary repetition or fragmentation. They must, therefore, be regularly placed; they must look as far ahead as possible; and they must above all be fully justified and specific. In America, the India Supply Mission had to prove categorically that what we wanted was directly or indirectly related to our war effort and that the Government of India exercised the strictest control in the actual use and disposal of these materials. Items falling under Lease-Lend were specified and originally such items as Steel, Railway, Dock equipment, Telephone and civil aircraft, Non-ferrous Metals, machine tools, agricultural machinery, road-making machinery, dyestuffs, timber, newsprint etc., were included. Changes, however, occurred from time to time. For instance, it was ordered that from 15th November 1948 items like machine tools etc., would not be admissible under Lease-Lend for civil requirements.

The U.S. Government experienced great difficulty in meeting increased demands and advanced planning appeared essential. They, therefore, introduced a system of six monthly or yearly forward programme estimates of the stores required or Lease-Lend or dollar purchase by any country. A comprehensive standard commodity classification list of almost all the stores U.S.A. could export was composed and in order to have uniformity in placing estimates by all countries a form commonly known as 'K' form was prescribed. In arriving at net import requirements from the U.S.A. it was necessary to show the indigenous production and expected imports from the U.K. and other countries. After examination of estimates of all the demanding countries the American Administration allocated export quota for each country.

The Lease-Lend policy towards India was determined by the importance of India's strategic and geographic position in the far Eastern part of the war. India was a major supply centre for the war against Japan. She provided the Allied Armies in the East with small arms and other munitions and with clothing, shoes, tents, parachutes and other textile products. With increasing military demands everywhere and shipping contraction, the classes of goods potentially eligible for Lease-Lend could cover almost anything on which a definite minimum national demand could be declared. But, at the same time, difficulties of procurement were proportionately greater and to obtain from India the basis on which the demand was made, to put before the American Organisation a statement of the position side by side with other demanding countries, equally clamorous, represented a task of increasing magnitude.

India received mainly Ordnance Stores, ammunition, aircraft and parts, tanks, motor vehicles and parts, watercraft, industrial materials and agricultural products. Lease-Lend munitions helped to build up the striking power of the Indian forces, while the machine tools, steel and other materials and equipment added in increasing the Indian output of munitions, in building airfields and speeding the flow of supplies through Indian ports and on Indian rail-roads. The total amount of supplies and services made to India under Lease-Lend up to the termination of this Act is estimated at Rs. 611 crores.

The accounting arrangements presented a great difficulty. It was very difficult to obtain exact information about Lease-Lend supplies, particularly in determining on whose account various categories of goods were received—whether they were on account of H. M. G. or of India itself. The accounting difficulties were obvious to any one who gave the matter a little thought, for an average time-lag of six months occurred between the despatch of Lease-Lend material and its arrival at destination in India. Moreover, some goods were sunk inevitably *en route* to this country.

Simultaneously with the establishment of Lease-Lend Section (American Purchase Section) in the Main Secretariat of the Supply Department, it was considered essential that a strong accounting organisation should be created to keep records of all the transactions. A Chief Accounts Officer (American Purchase) was appointed in August 1941 with Deputy Chief Accounts Officers at Delhi, Bombay, Karachi and Calcutta for the accounting of transactions connected with Lease-Lend stores and imported stores ordered by the Government of India.

(b) RECIPROCAL AID

It should be noted that Lease-Lend was not an entirely one way affair. In the United Nations Declaration of January 1, 1942 the contracting governments pledged themselves to employ their full resources, military or economic, against those nations with which they were at war. It was in January 1942 that the first American Expeditionary Force to be sent directly to the European Theatre landed in Northern Ireland. The arrival of this contingent of American troops marked the beginning of what then became a world wide programme of Reserve Lease-Lend now known as Reciprocal Aid—a vast programme of supplies and services for American Forces abroad made available by the Allies without cost to America. In February, the Master Lease-Lend agreement with Great Britain set down the over-all policy. Among other things, the British also agreed to provide "supplies, materials, and services needed in construction of military projects, tanks and similar capital works required for the common war effort in the U.K. or in the British Colonial Empire". In short, the Reciprocal Aid Agreements signed by the U.K., Australia, New Zealand and Fighting France, etc., rested on the simple principle that each participant provided the other with such articles, services, facilities and information as each was in a position to supply for the joint prosecution of war.

In India, the Reciprocal Aid in the beginning was confined to the U. S. Armed Forces actually stationed in India. Later its scope was widened and raw materials such as tea, mica etc., were brought within its range. A procedure to enable the U.S. Army Headquarters to get their requirements in bulk was devised. The guiding principle was that no financial adjustment was to be made between the Govt. of India and the American authorities but a record of transactions but not of value was communicated by the Government of India. Stores and services required by the U.S. Forces were procured through the ordinary supply channels of the Government of India. All demands were signed on behalf of the Commanding General, Service of Supply, U.S. Forces in India and placed on the Brigadier, Provision, Co-ordination and Supply indicating where the stores were required. The demands were scrutinised from the point of view of eligibility for transfer on Reserve Lease-Lend by a small Committee. On acceptance, the demands were passed for compliance to the Provision Branches of the Defence Headquarters who ordered releases from convenient depots and arsenals subject to later adjustments by the Supply Department.

In the summer of 1943, the United Kingdom agreed to extend the principle of R/A to include many raw materials and foodstuffs shipped to the United States. This principle was extended to India from 1st April 1944 and from then the United States began to obtain rubber, rope fibres, chrome, asbestos, tea, coconut oil, cocoa and several other raw materials and agricultural products without payment. So far as India was concerned, broadly speaking R/A took the following three forms:—

- (a) Reciprocal Aid to the U.S.A. Forces in India in the shape of rations, clothing, ordnance and other stores, accommodation, airfields and connected works and the provision of transportation, communication and maintenance facilities of various kinds.
- (b) Reciprocal Aid to U.S. shipping using Indian ports in the shape of port dues of all kinds, ship repairs and so on.
- (c) Available raw materials and available foodstuffs such as tea required by the U.S. Govt. directly for war purposes.

As regards (c) it was agreed that R/A terms should be applicable to all imports by U.S. Govt. and its agencies of essential requirements for direct war purposes of raw materials and foodstuff from India. Burlap which was a manufactured article was specially brought within its scope. This principle, however, was not extended to civil consumption.

American Forces were given Reciprocal Aid on a substantial scale. Accommodation of various types was made available in addition to the construction of airfields, hospitals and other facilities for troops etc. The construction of aerodromes was one of the largest items of R/A expenditure. In addition, India furnished large quantities of gasoline, hundreds of trucks, built warehouses, repair shops, clothing and services such as light, heat, communications, water and electricity, labour and repair services for motor transport, aircraft and ships etc., under R/A. Rations, ordnance and medical stores, transportation, tele-communications, dock, port and harbour facilities were also provided. From 1st April 1944 onwards exports of raw materials under this Aid have been considerable and important in the United Nations' war effort. India was the sole source of jute for burlap bags and the principle supplier of mica essential to the production of radio equipment for armed forces. Other important raw materials such as manganese, shellac, talc, beryl and kyanite, black pepper, etc., were supplied. Total aid furnished to United States by India upto the time of its termination (2nd September 1945) was about 200 crores.

Regarding the benefits of Lease-Lend and Reciprocal Aid and their importance, the late President Roosevelt said "Lend-Lease and reverse lend-lease are not a system of debits and credits. They involve neither gifts, nor loans:

or transfers of money. They are, instead, a system of mutual war supply that has been evolved by the United Nations to make possible the effective combined operations by which we are fighting and winning the war. The benefits which we and all of the United Nations have already mutually received from this system are beyond price".

Indo-American Lease-Lend Settlement.—With the termination of L/L and R.A. with effect from the midnight of September, 1st, 1945, the question of financial settlement was taken up by the U.S.A. Government. They invited India along with other Commonwealth Governments to send a delegation for an over all financial settlement of all L/L and R.A. accounts as well as those of the American surpluses transferred to the Indian Government under a separate agreement of the 27th February, 1946.

A high powered team under the leadership of the Hon'ble Mr. A. A. Waugh, C.I.E., I.C.S., Supply Member, having representatives of the Finance Deptt., was sent for this job.

A comprehensive agreement, the gist of which is given below, was arrived at between the two Governments and signed in Washington, D.C. on the 16th of May 1946.

TERMS OF THE AGREEMENT

(1) This agreement was a final settlement for all Lease-Lend, Reciprocal Aid and surplus war property located in India and for financial claims for each Government against the other arising as a result of World War II.

(2) In view of approximate equal benefits received by the U.S.A. and India from this inter-change of mutual Aid, which aggregated over a billion dollars in value, it was agreed that no dollar payments would be required in settlement between the two Governments and all obligations arising out of Lease-Lend Reserve Lease-Lend were balanced against each other and cancelled except for pre-existing agreement under which India had to return to the U.S.A. the silver received during the war.

(3) Under this agreement the U.S.A. received full title to all articles received from India during the war under reverse lease-lend and the remaining in inventory. India agreed to cancel the outstanding obligation of the U.S.A. to pay about 45 million dollars in cash for supplies delivered to the U.S.A. Armed Forces in India after V. J. Day. The agreement on that provided that India received full title to all articles in civilian lease-lend inventory as on V. J. Day and to a relatively small quantity of articles which were in lease-lend pipe line for delivery after V. J. Day. Articles in India military lease-lend inventory, which were acquired by the India Forces when serving with British Army, were retained by India, subject to a right of re-capture by the U.S.A. The U.S.A. however, agreed not to exercise this right generally.

(4) The agreement passed the title to all unsold U.S.A. surpluses to India and India agreed to dispose of these surpluses on an equal basis with war surpluses of Indian and U.K. origin. Further details relating to the disposal of the American surpluses are given in the Chapter on Disposal, under sub-head American War surpluses.

This financial settlement is specially significant because it is the first formal agreement between India and the U.S.A. and its harmonious completion is the auspicious opening for relations between the U.S.A. and India now on the verge of independence. Successful conclusion of these negotiations augurs well for the future of relations between the two countries.

CHAPTER XXXIII

JAPANESE AGGRESSION—AMERICAN TECHNICAL MISSION— W.R.C.C.

Until the summer of 1941 when the effect of the Lease/Lend Legislation in the United States began to be felt in India, contacts between India and the United States had remained more or less normal. America was buying mica, manganese and other raw materials from India, while India was buying from America motor vehicles, chassis, machine tools, and other things required for the war effort, as well as a large range of ordinary merchandise the flow of which was naturally restricted by the dollar exchange position. The position, however, changed with the establishment of India Purchasing Mission (later known as India Supply Mission) in the United States. India had to state very fully her case for Lease/Lend facilities and after a study of the documents presented to them by Indian Government representative, the American experts suggested that India might benefit considerably by the visit of American Technical Mission. Moreover, the military situation in the Pacific area and in South East Areas underwent a great change early in 1942 and this brought out the urgent need of utilising India as a Supply Base for the United Nations in the Middle and Far East and also emphasised the need of developing as fully and as rapidly as feasible her industrial resources to enable her to be used as a Supply Base. The suggestion of the American Government to send a Technical Mission was welcomed by the Government of India and accordingly in April 1942, a Technical Mission (widely known as Grady Mission) headed by the Honourable Henry Grady, formerly Assistant Secretary of State, U. S. A., assisted by three of the leading industrialists arrived in India. The main aim and object of the Technical Mission was to devise ways and means of stepping up the war production programme of India so that Indian production might become of greater value to India and the United Nations. With the advice of the Grady Mission, the Eastern Group Supply Council and with the co-operation of Indian Industrialists the Government of India did increase the productive capacity to a very considerable extent. The Mission, however, was expected to determine the manner in which the available resources of India could be utilised to the maximum. In dealing with this problem, the Mission was to give its primary consideration to improvements that could be effected immediately but it was expected that feasible longer term projects would also be studied, i.e., projects which could be brought into fruition within a period of 18 to 24 months. The Mission's sole object, however, was to concentrate on the needs of the war and not to build the post-war industrial capacity of India. The Mission was here for five weeks, and their conclusions were that much had already been done in India despite grave handicaps in equipment, materials and personnel, but further efforts were needed, and India, the Mission felt sure, would respond to the challenge of the Axis Forces at her gates as Great Britain did after Dunkirk and the United States after Pearl Harbour.

The Mission was definitely of the opinion that the two-fold problem of augmenting the production of certain peace-time commodities required for war, and converting peace-time industries to new war production, could be solved only by a strong centralised power vested in and exercised by Government. They, however, did not advise upon the precise Government organisation most suited to the solution of the problem, but merely suggested the following possibilities:—

- (a) High-powered control, independent of established Government agencies, on the American model;
- (b) The separation of "production" and "supply" and the establishment of a new department for the former;

- (c) The Division of the Supply Department into two parts, one dealing with "production" and the other with "supply".
- (d) The establishment of a War Cabinet with a strong secretariat to control war production in all its phases. This War Cabinet should consist of members responsible for production, transportation and communications, defence and finance.

They next advised that immediate steps be taken to deal with the problems resulting from the severe strains imposed by the war upon the railways, the ports and the telegraph and telephone systems. In regard to the railways the Mission, with the approval of the Government of India, recommended to U. S. Government the loan to India, in an advisory capacity, of an outstanding railway administrator with two experts in operation and maintenance, respectively. They also specifically recommended a further investigation into the possibility of producing power alcohol; further measures to extend the availability of electric power; the expansion of the steel industry; the rationalisation of plants producing munitions, concentration in respect of aircraft and ships upon repairs rather than new construction; the manufacture in India of a general purpose military radio set; measures to stimulate the production of aluminium; measures to conserve tin and rubber; adjustment in the arrangements for the treatment of timber; and the acceleration of the production of refined sulphur. Finally, they recommended the further expansion of the Government of India's Labour Training Scheme. During their stay, the Mission also telegraphed to Washington some 35 specific requests for essential machines, materials and personnel, etc.

W. R. C. C.—The Mission's preliminary report was expeditiously considered by the Government of India and the Governor-General-in-Council decided to implement its recommendations to the maximum extent possible. In pursuance of one of the most important recommendations, a Committee of the Executive Council was set up to deal with and co-ordinate problems of war production, transportation, communications, finance, rationing of goods and materials, and all concerned matters. This Committee was known as the "War Resources Committee of Council" and consisted of:—

1. H. E. the Governor-General—President.
2. H. E. the Defence Member.
3. The Hon'ble the Supply Member—Vice-President.
4. The Hon'ble the Finance Member.
5. The Hon'ble the Commerce Member.
6. The Hon'ble the Communications Member.

The Committee had a whole-time Secretary. It met from day to day and one of its first tasks was to push on with the action already taken on the Report. The War Supply Board was abolished with the setting up of this Committee. The Committee, when necessary, co-opted other Members of the Executive Council, and its decisions were binding on all authorities in India.

CHAPTER XXXIV

WAR CONTROLS—THEIR NECESSITY AND ADMINISTRATION WITH SPECIAL REFERENCE TO WAR SUPPLIES

War on modern scale represents a great economic upheaval and the outcome depends as much upon successful organisation of the economic front as of the military front. The basic problem of war economy is the fullest mobilisation of the economic resources of the country. One cannot fight a total war without an all-embracing mobilisation. This involves (i) a shift of productive resources from the less essential to the more essential purposes, (ii) utilisation of unused capacity, (iii) the absorption of the unemployed, (iv) longer hours of work and wherever possible, greater intensity of work, and (v) rationalisation of economic processes by improving the existing ones or by setting up of new ones. For achieving the above objects, it becomes essential to introduce various economic controls in war-time. Government requires goods and these too in huge quantities. This naturally sets up an upward trend in prices. No Nation has enough resources to satisfy both civilian and war demands for goods in the quantities desired.

The most important problems of Government control in war-time centre in the acquisition of goods needed for war and civilian use. The insatiable demand for war material on the one hand and the limitations of raw materials available for producing both war and civilian goods on the other hand give rise to difficult problems. Not only must the war machine be supplied with goods in the quantity and order desired, but the acquisition of these goods must not be allowed to create mal-adjustments in economic activity which would weaken the war effort. Nations, therefore, when threatened with war, or actually involved in war, must subject their economic systems to ever-widening controls.

In war-time, Government attempts to raise the volume of production by every means available. Efforts are made to expand labour productivity by the more efficient use of skilled workmen, to increase hours of work, to work plants continuously and to foster greater standardisation of military equipment so that it may be made more adaptable to the mass-production process. Priorities, allocation and other controls increasingly assume more importance in the efforts to lift the level of production.

The imposition and exercise of these controls to meet the needs of war result in a war economy as distinct from a peace economy. It is no simple task to convert a peace-time economy and place it on a war-time footing. In a war-economy, decisions of individuals count far less than in a peace-time economy. Prices, profits and personal decisions no longer determine the movement of raw materials and finished products. Rather, priorities, allocations, requisitioning, rationing and other such controls, exercised by Government, determine what goods shall be produced and who shall get them. Prices are controlled and great modifications are made in the profit motive. In a war economy, Government is given the power to make decisions so that it can determine the output and distribution of products needed to build its military establishment and maintain civilian morale.

India was called upon to meet huge war demands and had to change from a peace-time to a war-time economy. The Supply Department was charged with the responsibility of arranging war supplies at fair and reasonable prices. It had, therefore, to apply controls over the production, distribution and prices of essential raw materials and/or finished goods and to see that the available resources were allocated for war and essential civil needs. Many controls had, therefore, to be applied. A list of controls instituted and administered by the

Supply Department during war is attached. Main features of some of the important controls are summarised below:—

1. Iron and Steel (Controls of Production and Distribution) Order.—This order was designed to secure the best possible utilisation of specified categories of iron and steel and restrict the acquisition and disposal of these materials to cases covered by a licence issued by the Iron and Steel Controller and certain main quota-holding Departments. Power was also taken to fix prices and to control the creation of new productive capacity. The M. G. O. was the Superior Priority Authority for determining the quarterly allocations of iron and steel to the quota holders.

2. Iron and Steel (Scrap Control) Order.—This Order prohibited the acquisition of scrap by any producer from any source, and also the acquisition of scrap from "controlled" sources by any other person save under the authority of a written order from the Iron and Steel Controller. The Order also empowered the Iron and Steel Controller, acting with the approval of the Central Government, to fix prices for different classes of scrap. The Order sought to ensure the proper utilisation of scrap in the interests of the war effort.

3. Ferro-Alloys Control Order.—The Order regulated the use, disposal and acquisition of specified ferro-alloys in accordance with the written orders of the Iron and Steel Controller.

4. Non-ferrous Metals Control Order.—This Order prohibited the production or import of certain metals, save in accordance with licences issued by the Non-ferrous Metals Controller. It also regulated, by licence, the use, disposal and acquisition of the metals. A producer was, however, authorised to dispose of small quantities without a licence. In practice, the import of the quotas allocated to India by the Combined Raw Materials Board were mainly on Government account and the control operated in the field of indigenous production and distribution.

5. Colliery Control Order.—This Order was issued in April 1944 under Rule 81 (2) of the Defence of India Rules to exercise statutory powers over the production and distribution of coal, when the coal supplies were faced with a crisis and it was even becoming difficult to meet the rationed allotments to various consumers. The Order was amended from time to time. It gave Government the following principal powers:—

- (i) to issue such directions as it thought fit to any colliery owner regulating the disposal of his stocks of coal or his output of coal;
- (ii) to fix the price at which coal might be sold by colliery owners;
- (iii) to fix the prices chargeable by middlemen;
- (iv) to prohibit the sub-division of any colliery except with the previous permission of the Central Government;
- (v) to prohibit the opening of any new colliery except with the permission of the Central Government; and
- (vi) to constitute a Board to be called the Coal Control Board to advise the Central Government on all matters relating to the production and distribution of coal.

6. Coal Production Fund Ordinance.—Very considerable expenditure was incurred by Government on various measures, viz., Bonus schemes, the Gorakhpur Labour, the Open Cut Coal Mining Operations, etc., to increase coal production. It was felt that expenditure on these items should be a charge on the consumer of coal rather than on the general tax payer. Accordingly on 26th August 1944, the Coal Production Fund Ordinance was promulgated which gave Government power to levy a cess on all coal and coke despatched from collieries

in British India at a rate not exceeding Rs. 1-4-0 per ton. In addition, Government was allowed to levy a cess on all coal and coke brought into British India from Indian States.

7. Control over the distribution of cement.—Orders were issued in August, 1942, under D. I. R. requiring cement companies to reserve and supply 90 per cent. of their monthly production to Government and not to dispose of the balance of 10 per cent. except under Government orders. The Order was necessary as almost 90 per cent of the indigenous output was needed for defence use and cement companies had to be protected against possible claims from others on account of a breach of the existing contracts. The Order was amended in January 1943 and in the revised form abolished the reservation of 90 per cent. of output for Government purposes but required the cement companies to dispose of their entire output in accordance with Government instructions. Releases for civil use were regulated by specific orders issued by the Honorary Cement Adviser or Honorary Regional Cement Advisers.

8. Sulphuric Acid Control Order.—This Order provided for the registration of manufacturers and prohibited the sale or acquisition of sulphuric acid except under licence. The prices of different grades of sulphuric acid were also fixed. The Order became necessary in view of an unjustifiable increase in the price of sulphuric acid and the inability of essential consumers to get supplies in the midst of an over-all scarcity.

9. Chrome Compounds Control Order.—This Order was issued in October 1941 under Section 81 (2) of D. I. R. Ninety per cent. of the normal consumption of chrome compounds in the country was taken up by the Textile industry and the balance went into the manufacture of matches, paints, medicines, etc. With the growing Government demand for khaki cloth for the Armed forces, available supplies of chrome compounds would have been inadequate to meet the civil requirements of the Textile Industry. The Order, therefore, prohibited the use of chrome compounds by the Textile industry save in respect of cloth ordered by Government. There was no general prohibition on the use of chrome compounds for other industries, but sale or purchase was prohibited except on licence. Initially there was no price control but this was introduced in January 1942 by an amendment. This power was, however, exercised only in respect of Sodium Bichromates, because of the wide disparity between the price of the imported chemical and the local production. The Order was amended in April 1944 so as to permit the use of chrome compounds for civil textiles also.

10. Coal Tar Products Control Order.—This Order provided for the registration of sellers of specified coal tar products, prohibited sale except by registered persons and regulated the use and acquisition of coal tar products by licence. An exception to the regulation of sale and acquisition existed in respect of small quantities required for medicinal purposes.

11. Bleaching Powder and Chlorine Control Order.—This Order prohibited the sale and purchase of chlorine and bleaching powder except under permits. Power was also taken to fix the prices at which manufacturers or importers might supply bleaching powder or chlorine to consumers.

12. Rubber Manufactures Control Order.—The world shortage of rubber made it necessary for India, as for other countries, to control strictly the use of rubber. The Rubber Manufactures Control Order, therefore, prohibited the treating, use or consumption of rubber except under the authority of and in accordance with licences granted by the Controller of Rubber. The order also empowered Government to fix maximum prices for rubber manufactures and this was done for a number of items in a separate notification in February 1945.

13. Tyre Rationing Order.—This Order was another step taken for the conservation of rubber supplies. Under it, motor-car tyres and tubes and giant

tyres and tubes, whether new, retreaded (tyres only) or second-hand, could be sold or acquired only against permits issued by Provincial Rationing Authorities. The Order also required the surrender of unserviceable tyres and tubes before new ones could be acquired.

14. Control over Selected Tanneries.—Orders under Section 81 (2) of D. I. R. were served on 28 tanneries in September 1942 requiring them to carry on business in accordance with the directions of the Controller, Leather and Tanning Industries, Cawnpore. More tanneries were subsequently dealt with similarly and on V-J Day the number was forty. The object of the Order was to ensure that the tanneries worked only for Government so that increasing war demands for leather could be met. The Controller, Leather and Tanning Industries, Cawnpore, was authorised to compel tanneries to purchase hides of the required grades at prices fixed by Government. He was also empowered to control the methods of processing adopted by the tanneries and to direct the disposal of finished leather.

15. Factories (Control of Production) Order.—This Order applied only to private factories engaged in the production or fabrication of metal or any engineering work and enabled authorised officers to

(a) prohibit any such factory from carrying out work of specified types otherwise than in accordance with general or special orders issued; and

(b) require such factory to undertake work of any of those specified types. The object of the Order was to enable Government to utilise specialised capacity for supply purposes and to ensure that such capacity was put to proper use only.

16. Undertakings (Charges and Accounts) Order.—This Order enabled Government to fix the charges payable in respect of work undertaken by a firm in accordance with any directions issued under Section 81 (2) (c) of D.I.R.

17. Machine Tool Control Order.—This Order regulated by licence the import, production and acquisition of specified machine tools.

18. Paper Control (Production) Order.—This Order provided for the registration of all manufactures and prohibited the manufacture of a variety of paper other than those specified in the Order without the written permission of the Director of Paper. The object of restricting the production of paper to certain specified varieties was to increase the total output of permissible types.

List of controls exercised by the Supply Department as on V-J Day.

Metals.

1. Iron and Steel (Control of Production and Distribution) Order.
2. Iron and Steel (Scrap Control) Order.
3. Steel Import Control.
4. Steel Export Control.
5. Ferro-Alloys Control Order.
6. Non-ferrous Metals Control Order.
7. Iron and Steel (Movement by Rail) Order.
8. Iron and Steel (Movement by Road or River) Order.
9. Cotton Baling Hoops (Control of Movement) Order.

Coal.

10. Colliery Control Order.
11. Coal Production Fund Ordinance.

Cement.

12. Control over the distribution of cement.
13. Cement (Movement by Rail) Control Order.
14. Cement (Movement by Waterways) Control Order.

Chemicals.

15. Sulphate of Alumina Control Order.

16. The Sulphuric Acid Control Order.
 17. The Chrome Compounds Control Order.
 18. The Coal Tar Products Control Order.
 19. Bleaching Powder and Chlorine Control Order.
- Petroleum Products.
20. Control over the distribution of Diesel Oil.
 21. Control over the distribution of Furnace Oil.
 22. Control over the distribution of White Spirit.
- Rubber.
23. Rubber Manufactures Control Order.
 24. Tyre Rationing Order.
 25. Control over the prices of Motor car and Motor cycles tyres and tubes and Giant tyres and tubes.
 26. Control over the prices of Retreaded Pneumatic Tyres.
 27. Control over the prices of "Factory Seconds" Pneumatic tyres and tubes.
 28. Control over the prices of Cycle Tyres and Tubes.
- Leather.
29. Control over Selected Tanneries.
 30. Hides (Movement by Rail) Control Order.
- Miscellaneous.
31. Factories (Control of Production) Order.
 32. Undertakings (Charges and Accounts) Order.
 33. Machine Tool Control Order.
 34. Imported Engineering Stores Control Order.
 35. Paper Control (Production) Order.
 36. Timber Control Order.
 37. Control over the distribution of crude tar.
 38. Control over the distribution of Road Tar and Bitumen.
 39. Jute Industry Essential Stores Control Order.
 40. Agar Agar Control Order.
 41. Control over Glass Factories.
 42. Sisal and Aloe Film Control Order.
 43. Essential Drugs (Census) Order.

CHAPTER XXXV

EXPORT AND IMPORT TRADE CONTROL

During war when the entire resources of a country are being organised for the achievement of an agreed objective, i.e., victory, and the whole economy is planned to that end, it is but natural that foreign trade should also be subjected to rigid control. Without a system by which important raw materials and producers' goods are distributed according to some preconceived system of graded requirements, production for war and for purposes of meeting the minimum requirements of the civilian population would be impossible. Like most other countries, India too was forced to bring both her export and import trade under control.

The four chief features of Indian foreign trade before the war were: (1) the predominance of raw materials in export and manufactured goods in imports; (2) the gradually increasing excess of merchandise exports over imports; (3) the dominant role of the U.K. both on the import and export sides; and (4) the adoption of free trade policy.

The whole outlook of the export and import trade had necessarily to change during war. Free trade cannot be allowed. Quite obviously, a Government has to see that its nationals do not import or export to or from any enemy country. The war production requirements of the country at war along with its Allies are first to be met and then the bare necessities of civilian life. In war the needs for military purposes, direct and indirect, levy a special tribute on the sources of normal supply. Further, the possibility of the increase of such supply from abroad is lessened and the available supply for war and civil needs is consequently usually less than in normal times. Apart from the above factors, Government has also to take into consideration the foreign exchange policy. It must conserve as far as possible the hard currencies and try to obviate imports from such currency countries. An elaborate system of export restrictions has to be devised with a view to preventing supplies of certain exports reaching the enemy by direct channels and to conserving the supplies of a number of essential articles either for internal consumption or for the use of Allied countries. Export of certain articles has to be completely prohibited and those of others permitted only under licences. Similarly, to solve the foreign exchange problem, import of commodities which can be restricted without much difficulty or which can be easily replaced by indigenous goods or goods imported from countries in respect of which the foreign exchange problem is less acute, has to be resorted to. Further considerations guiding the import trade control are the economising of shipping space and the optimum of utilisation of the productive capacity of friendly nations overseas for essential war purposes. In fact, exchange control which is essentially control over the receipts and payments in foreign currencies necessarily involves control over movements of goods and services whether as exports or imports. These problems are common to every nation engaged in a brutal and total war.

Import Trade Control.— In India foreign and internal trade fall within the sphere of the Commerce Department. But as they had immense effect on the problem of war production and supplies, Supply Department as the only supplier of war-like stores had to come into the picture almost at every stage.

Import control in India, unlike export control, was instituted several months after the outbreak of war. At the beginning of war no restrictions were placed on imports into India (except of course in respect of goods from enemy countries) and all importers could freely obtain foreign exchange for payment of goods. In May, 1940, however, S/S approached the Government of India to introduce a system of licensing imports of certain commodities from certain countries for the purposes of conserving foreign exchange, particularly dollar

exchange. At the same time, the Reserve Bank of India issued regulations forbidding the remittance of any amounts overseas in payment of imports unless the importer in India was in possession of an import licence, thus ensuring that no goods, whose entry into the country would be barred, were paid for prior to arrival. The expenditure on war equipment and war supplies which the Allied Powers had to buy from countries overseas was so vast that it was extremely important to ensure that their resources of overseas currency were most carefully husbanded.

The commodities of which imports were restricted were at first divided for purposes of licensing into three categories imports of which from different currency countries were (a) prohibited (b) restricted to three quarters, one half or one quarter of pre-war normal and (c) restricted to pre-war normal value. The number of commodities brought under import control was 68 in May 1940. These were mostly luxurious articles or articles available in sterling areas. In July 1941, a number of other commodities *viz.*, Cotton twist, yarn, ribbons, artificial silk and staple fibre yarn, cotton piece-goods and tents and artificial silk piece-goods were added to the list. In August 1941 fresh items which for the greater part comprised machinery and other industrial requirements were brought under import control and the total number of items thus increased to about 250.

By Mid-1942, the shortage of shipping space caused by ever increasing operational demands and by the heavy losses at sea created another problem. The shipping shortage made import control even from sterling area imperative. The import control was also used as a method of preventing trade with enemy or blacklisted firms.

The import trade control was administered by Import Trade Controllers functioning at the four major ports under the Commerce Department. In respect of imports, the restriction generally took the form of fixation of quotas on the basis of pre-war imports and a quota recommendation certificate had to be obtained from the Import Trade Controller. Steel was brought under control at the end of 1940 and a Steel Import Controller appointed under the Supply Department and so were machine tools in 1941. What was done in the case of steel had later on to be done in the case of all imports when a Chief Controller of Imports was appointed to establish a system of priorities and issue priority certificates after examining carefully all the conflicting claims from all parts of the country in respect of imports.

The Schedule of the Import Control Notification was divided in two parts, A. and B. Most of the goods included in Part A were left to be licensed by the Import Trade Controllers at the ports under the quota system based on past imports. Industrial requirements and machinery were placed in Part B and were to be licensed on merits by a Central authority. Arrangements were also made for the essentiality of imports to be certified by the C.C.I. where this was demanded by the supplier country. In January 1942, the powers of licensing of various classes of goods to authorities having a specialised knowledge of the requirements of the industries concerned were delegated. Licensing of nearly all kinds of rubber manufactures, A.R.P. equipment, mineral oil and greases was delegated to the Supply Department (D.G.S.). The D.G.M.P. Calcutta was entrusted with the licensing of a wide range of engineering stores, industrial tools, etc. licensing of machinery, apparatus and component parts for the textile industry (other than jute and hemp) was delegated to the Cotton Textiles Directorate, Bombay, etc., etc.

Apart from the quota system a Panel system was also introduced for the licensing of certain classes of goods mainly electrical goods and engineering stores, which were in short supply in the U.K. The object was to associate prominent members of the trade interests concerned with the licensing authority and the D.G.M.P. in estimating India's requirements from the U.K. and in the equitable distribution of the available supplies. Only firms which had imported

any goods of the classes of Panel goods concerned in the year ending the 30th June 1939 qualified as importers. A Working Panel was appointed for each class of panel goods and its recommendations were passed on to the Advisory Panel of Importers which acted as Adviser to the D.G.M.P. A Directorate of Imported Panel Stores was established under the D.G.M.P. by the Supply Department to deal with panel goods.

Originally the Import Trade Control Notification was divided in Part 'A' and 'B' but later on it was divided into five parts, I, II, III, IV and V.

Part I had items like Iron and Steel, pipes, tubes etc., which were controlled by the Steel Import Controller. Part II had items like tea chests and parts, raw manilla hemp, raw sisal fibre, metals, bearings, small tools, abrasives, electrical goods etc., etc., concerning the D.G.M.P. A Deputy Chief Controller of Imports at Calcutta issued licences in consultation with D.G.M.P. Part III had items like cotton raw, cotton ropes, textile machinery, healds, reeds and shuttles, bobbins, etc., etc. A Deputy Chief Controller of Imports at Bombay issued licences in consultation with the Textile Commissioner. Part IV had such items as animals, meat, fish, milk, drugs and medicines, wool and woollen goods, etc. The Import Trade Controllers issued licences for these in consultation with C.C.I. on quota system. Part V had items like pulse, wheat, starch, chemicals, tanning materials and the Chief Controller of Imports issued licences of imports.

Goods falling in Part II, III, and V of the Schedule were licensed on merits mainly on the basis of Indian production of the goods concerned, availability of indigenous substitutes, importer's average annual consumption and importer's previous imports of similar goods.

Before granting a licence, the administrative department responsible for the goods was invariably consulted and only on its recommendation, a licence was granted. For example in licensing non-ferrous metals, the Non-ferrous metals Dte. of the D.G.M.P. was consulted. For mineral oils, the advice of the Petroleum Directorate was sought and so on. There were, however, various classes of goods the import of which from particular countries was not restricted. This was under the Open General Licences. Under this there was a general permission of imports from Ceylon, of oil from Persian Gulf, goods from Portuguese Possessions in India and goods on Lease-Lend as well as cash purchases on Government orders from U.S.A.

Export Trade Control.—Export Trade Control first came into being as a weapon of economic warfare. Such factors as prevention of essential commodities reaching the enemy, conservation of supplies for war, making supplies available for civil economy, distribution on equitable basis of available supplies necessitated the Control.

Broadly speaking, the export control took mainly the following four forms:—

- (1) Prohibition of all exports to enemy countries;
- (2) Prohibition of exports of certain articles to non-enemy countries;
- (3) Permission for the export of certain articles to non-enemy countries only under licence.
- (4) Permission for the exports of certain articles without licence or under an open general licence only to specified countries.

Exports of mica and mica-nits had to be controlled from the very beginning of war. An important development in the application of export control was the institution on the 9th March 1940 of a scheme for the control of foreign exchange proceeds of certain exports to the hard currency countries. To begin with only the exports of iron manufactures and rubber were covered by the scheme, but in June 1940, all commodities exported from India to hard currency

countries. Another measure of export control was the control of *entrepot* trade of Bombay in Japanese goods.

Originally the export by sea of certain specified articles, arms, ammunition, explosives, certain chemicals, surgical instruments etc., was prohibited through a Notification issued under the Sea Customs Act on 26th August 1939. Later on the export of steel and a large number of articles were added to the list. The first Export Trade Control Notification under the D.I.R. was, however, issued in May 1940.

The export trade control was in the beginning administered by the Export Trade Controllers functioning at Karachi, Bombay, Madras, Calcutta, Peshawar and Quetta. An Export Advisory Council was set up on the 11th May 1940 to act as a channel of communication between the Government of India and the exporting interests of the country so as to facilitate the discussion of difficulties arising out of the war and the legislation and regulations consequent thereon. Later on, a Chief Controller of Exports was also appointed at headquarters and the Export Trade Controllers throughout the country were placed under him.

As the export trade had an important bearing on the war production, it was decided that the administrative Department would issue licences for the items with which they were concerned, the main reason being to ensure that exports did not adversely affect the supply position of these commodities or embarrass the Department concerned in its efforts to procure them for the Defence Services and other indentors, for instance, Supply Department for cement, bristles, etc., and the Food Department for cigarettes, foodgrains etc., etc. The Export Trade Control Notification Schedule was divided into Parts A, B, C, and D. Part A had items like arms, ammunition and military stores, asbestos cement, chemicals and chemicals preparations etc., and the export of these items was totally prohibited. Part B comprised animals, fish, fodder, fruits, provisions and oilman's stores and these were licensed by the Department of Food or by the Export Trade Controllers up to pre-war normal level in the case of countries bordering the Indian Ocean. Part C had bristles, cement, surgical and veterinary instruments, machinery and mill work, machine tools, etc., and these were controlled by the Supply Department. Part 'D' included abrasives, agar-agar, crude drugs, earthenware, glass and glassware, etc., etc. and licenses were issued by the Chief Controller of Exports after consulting the administrative department concerned.

When hostilities ceased, the whole position was examined and steps taken to relax Import and Export Control. Details are given in a separate chapter.

CHAPTER XXXVI

DIVERTED AND FRUSTRATED CARGOES

Diverted cargoes are those primarily intended for an Indian Port including Ceylon but actually landed at another port. Frustrated cargoes are those which were originally consigned to a country other than India but which for strategical or other reasons were landed at Indian ports.

Owing to unexpected developments in the war situation in December 1941 and early 1942 in the Far East, a number of steamers bound for ports in Burma, the British Possessions in the Far East and the Netherlands East Indies, were diverted to and discharged their cargoes at ports in India. These cargoes mainly comprised—

- (1) Service cargo—stores consigned to military formations.
- (2) Non-Service cargo—stores consigned to private parties and civil Government departments of other countries. Such cargoes included commercial cargo, Dutch cargo, Crown Colony stores, Burma Govt. cargo, Thailand and French Indo-China Cargo, Marila Cargo, Chinese Commercial Cargo and Chinese Government cargo.

The disposal of frustrated cargo was entrusted by H.M.G. to the Central Govt. in the Commerce Department which in turn, as a matter of administrative convenience, entrusted the work to the Supply Department who had the necessary machinery available at ports to deal with the matter and also had knowledge as to what stores were required for Govt. use. The object was threefold:—

- (i) To avoid congestion inside the dock areas by the discharge of unlimited quantities of stores from frustrated steamers;
- (ii) to secure, for the efficient prosecution of war, goods which might be needed by Government; and
- (iii) to safeguard the interests of the real owners of the frustrated cargo so that they might get back their money.

It was in December 1941 that the Secretary of State informed the Govt. of India that ships in the U.K. bound for Singapore and other Far-Eastern ports would terminate their voyages in Indian ports. Initially the shippers were asked by the agents of the vessels in the U.K. to make their own arrangements for the disposal of goods in the Indian market. Local agents of the consignors were accordingly allowed to take delivery of goods. This decision did not preclude the Govt. of India from requisitioning particular stores required for the more efficient prosecution of the war.

Later owing to the changed situation and diversion of cargoes on a much larger scale it was felt that if disposal was left to commercial interests there would be inevitable delays and congestion at ports. It was, therefore, decided that all such cargoes (leaving certain excluded categories, viz., Chinese cargo and wholly damaged or deteriorated stores) as were lying undisposed of in the Port Trusts or bonded warehouses should be requisitioned by the Govt. of India who would retain such cargoes as were required for war purposes and hand over the rest for disposal to the Anglo-Dutch Frustrated Cargo Committees which were set up in India by H.M.G. and the Netherlands Govt. in London. These Govts. indemnified the Govt. of India against any claims arising out of the cargoes handed over to the Anglo-Dutch Committees. The Govt. of India did not requisition Chinese Govt. stores but if they needed any they took them with the permission of the Chinese Govt. who agreed in a number of cases on an essential replacement basis. Chinese Commercial cargo was requisitioned by

Govt. of India but later on it was decided to hand the balance portion lying unclaimed in Port Trust custody over to the Pekin Syndicate, the official agents of the Chinese Govt., in pursuance of an agreement reached with that Govt. As regards cargoes belonging to Crown Colonies, the Govt. of India requisitioned them and paid compensation to H.M.G. on an agreed basis.

Out of the goods passed on to the Anglo-Dutch Committees, exports to Empire or Allied countries were allowed in cases when either the stores were unsaleable in India or they were considered useful for war purposes in those countries. A procedure was laid down in regard to the requisitioning of cargo. The procedure initially prescribed may be called the "freezing advice" stage. Manifests were scrutinised and only articles required were requisitioned. This meant delay and the policy of freezing stores in the hands of importers had, therefore, to be given up. In the next stage it was decided to release or requisition immediately any stores *prima facie* considered suitable for Govt. purposes and Local Receiving Officers of the Defence Services were brought into the picture and consignments in which they were interested were delivered to them.

Compensation for goods retained for Govt. use was paid by the Supply Department and that for goods disposed of by the Anglo-Dutch Frustrated Cargo Committees by the Diverted Cargoes Section. H.M. Board of Trade, London (to whom the sale proceeds of the goods were remitted by the Committees) or the Dutch Govt. The basis of compensation in general for the goods retained by the Supply Department for Govt. use was C.I.F. value *plus* $1\frac{1}{2}$ per cent. margin and certain incidentals, and as regards those disposed of by the British Sections of the Anglo-Dutch Frustrated Cargo Committees the basis was C.I.F. value *plus* 2 per cent interest less any adjustment or account of commission, discount, etc. Compensation for goods involving enemy interests was payable to the Custodian of Enemy Property.

The magnitude of the task was not appreciated in the proper perspective at the very outset or else a special organisation would have been set up for the purpose. The work was entrusted to the Controllers of Supplies at Bombay, Karachi and Madras and to D.G.M.P. at Calcutta. Policy questions were dealt with by Main Sectt. in consultation with the Commerce Deptt. Both departments frequently made references to the Secretary of State. There was considerable confusion and abnormal delay in the clearance and disposal of frustrated cargo as the organisation of the Controllers of Supplies was not adequately staffed.

Several other problems arose. For instance, some of the cargo requisitioned was, on closer examination, not wanted by Govt. ultimately. It was decided that such cargo must be acquired and any goods not required should be disposed of by the Supply Deptt. Detailed accounts were maintained of the compensation paid, demurrage, handling and storage charges, customs duty, losses and deterioration and departmental charges. The problem of handling of frustrated cargo gave the most trouble at Karachi as (1) Karachi was not equipped as an import port at all, and (2) the special method of clearing goods from ships at Karachi, *viz.*, loading into trucks straight from ships and shortage of rolling stock led to serious congestion. Moreover, there was abnormal diversion of ordinary ships to Karachi which over-loaded the Port. In many cases neither the owner nor a clearing agent was present at Karachi to arrange for the clearance of cargo. The Agents (Cox and Kings) appointed as Supply Department clearing agents could not cope with the volume of work which had eventually to be handed over to the N. W. Railway. Ships' manifests showed only brief details and there was difficulty in connecting packages with Bills of Lading numbers.

Conclusion.—Experience has shown that whole-sale requisitioning of all cargoes is essential as without this the Port Trusts can have no authority to deliver the goods to Govt. and but for Govt. stepping in goods cannot possibly

be removed from Dock areas expeditiously. When Government requisition the cargoes wholesale, it must arrange for their disposal as expeditiously as possible to some place outside the Dock area. The lack of a special organisation to deal with the varied problems that arise can add seriously to the delays that occur and this must be guarded against in any such future eventuality. A proper system of accounting in suitable ledgers, forms, registers, etc., has to be put into operation. Whatever is not taken over by various Government departments should be handed over to a Committee appointed by the Central Government for disposal. Such a Committee besides dealing with sale of goods should also have powers to release goods to claimants provided *prima facie* title is proved and adequate guarantees are produced. The absence of such an arrangement on the present occasion caused a lot of discontentment to the commercial community. A special organisation is also needed for assessing compensation for the cargo requisitioned and acquired. This organisation should work in close touch with and in all matters of policy should refer the cases to the Government of India. They can also finalise compensation on a uniform principle.

CHAPTER XXXVII

INSPECTION OF WAR SUPPLIES

The Indian Stores Department had its own Inspection Branch with headquarters at Delhi and Provincial Organisations at centres like Calcutta, Bombay, Madras, etc. The Director of Contracts' stores were inspected by the Ordnance Inspectorate under the M.G.O. Although the two organisations were merged with the Supply Department, their inspection arrangements continued separate for some time. Sudden increase in demands especially for engineering and general stores meant heavy work for the Inspection Branches and measures to rationalise Inspection to secure efficiency and economy had to be taken. Closer co-ordination between the two organisations was attempted and an Inspectorate of Engineering Stores created at Calcutta. Full co-ordination, however, could only be secured by amalgamating the two Inspectorates under a single authority. This was done by transfer of the I.S.D. Inspection Branch from the Supply Department to the Defence Department in May 1942 and formation of a single Inspection Branch under one authority, viz., C.G.I. The C.G.I. constituted two separate Inspection Wings—Civil and Military.

Stores were urgently required and delay in the supply might be disastrous from the point of view of war effort. Firms started night shifts to increase their production to meet heavy demands and employed additional technical staff and labour. Inspection was responsible to check, examine and test all stores and certify them as acceptable before they could be despatched by the firms. The conditions, under which supplies were being rushed through by the firms, were bound to lower the standard of workmanship of finished articles and in several cases even too low to meet the requirements of specifications. Inspection had thus very onerous duties to perform. They had to ensure that the quality of stores they were accepting, was up to the requirements of the specifications and any departures and deviations permitted were such as not to render the articles unsuitable for the service for which they were required. Yet if no relaxations were allowed, delays would occur and stores would not be forthcoming. Moreover, Inspection had to report on the suitability or otherwise of new firms coming up for registration as contractors. Inspection staff had to be increased considerably and there was serious difficulty in finding suitably qualified men. New men recruited had to be suitably trained. The Inspection staff had also to exercise a very close watch at every stage of manufacture to ensure that materials of proper quality were being used and methods of manufacture employed were such as to guarantee correct results and produce acceptable articles. The Inspection had also to guide and suggest improved methods of manufacture to new firms to expedite production. Whole-time technical subordinates had, therefore, to be posted to the premises of several manufacturers to carry out these duties.

In the initial stages the Inspection had to assist in the development of several new articles. Stirrup Pumps, Machine tools, Surgical Instruments, etc., may be quoted as examples wherein Inspection contributed a lot to the development of the stores. Even when the Planning Directorate had been created in the Supply Department, Inspection continued to guide manufacturers and maintained close liaison with the officers of the Supply Department.

CHAPTER XXXVIII

ASSISTANCE TO INDUSTRY

As already mentioned, the Supply Department could fulfil its obligations only by the development of production in the industrial field. It had to adopt various measures to achieve this end and rendered all possible assistance to industries. The policy of encouraging Indian industries was inherited by it from the late I.S.D. and the Contracts Directorate, but it pursued it much more vigorously.

The growth and development of the industries of a country can be stimulated by the State by the adoption of various measures such as loans and bounties, protection through tariffs, guaranteed orders for definite periods or at specially favourable prices and manipulations of railway freight rates. Some of these measures were outside the scope of the activities of the Supply Department. It was, however, in a position to grant loans or to provide Capital assistance, and to give guaranteed orders as it received firm demands on a Forward Programme basis. There are also other ways in which valuable assistance can be rendered by an expert Planning and Purchase Organisation. The Department was better able to explore the potentialities of indigenous source of supply, point out defects in manufacture and assist in remedying them by means of expert advice. It could act as a Central Bureau of Intelligence to keep the manufacturers and the Indentors in touch with each other. It could also help by substitution of indigenous material for imported articles in the course of its purchase activities and could suggest the same course of action to other buyers through the scrutiny of Home Indents. In its constitution were also inherent potentialities for rendering other assistance to the industry. It suggested standardisation to inspection and this was a recognized means to economy and efficiency both to manufacturers and buyers. It had, special opportunities to develop Indian industry as it had to meet large demands, including those for new stores.

Modern warfare depends for its successful completion on a voluminous and unremitting supply of goods. Soon after the outbreak of war, Supply Department was inundated with demands far in excess of the actual production and an Industrial Planning Organisation, manned by experts had to be established. The Department also established a close link with the Industry through Advisers, Advisory Committees and Panels to draw upon technical and experts experience.

Planning means either realignment of the existing capacity or the development of potential capacity. It was essential to find out what and how much the country had in the way of resources. The chief problem was of production—translating our resources into ships, ammunition and other war supplies. Capacity had to be created or realigned. Different types of assistance had to be rendered to prospective manufacturers. Bottlenecks were many—raw materials, plant and machinery, skilled labour, transport, price negotiations, inspection, delivery and any one of these could reduce the flow of supplies to a trickle.

Government had its own factories for manufacturing munitions, clothing, Harness and Saddlery, scientific instruments and explosives. The Department, however, planned, improved and extended the production of war material not only in its own factories but also by offering advice, results of scientific research and technical assistance to certain civil factories and workshops. In particular cases, Government advanced capital or supplied machine tools for the extension of civil workshops.

When an article could not be supplied according to the specification, every effort was made to find a suitable substitute and to persuade the indentors to carry out tests in order to decide whether the substitute was acceptable.

The exploration of indigenous sources of supply generally necessitated an actual inspection of factories and their plants, examination of processes of manufacture, estimation of output and determination of financial stability and capacity for service. This investigation also entailed a comparison of the quality and price of the indigenous product with similar imported articles. Any defects coming to the light were brought to the notice of the manufacturers with advice and suggestions to rectify the defects or directions for making improvements. Whenever necessary, technical officers visited the works and advised or discussed matters with the manufacturers.

One essential of modern industry is the existence of the fewest possible standards compatible with efficiency and economy and of specifications and patterns for such standards. Standardisation work if judiciously developed results in elimination of unnecessary sizes and types and in unification of design and make up. It is a means to eventual economy and efficiency and is of value both to the manufacturers and the buyers. The Department took advantage of every opportunity that offered itself to reduce the types and sizes in respect of Government stores to the fewest number possible. As a result, not only have practical benefits actually accrued to the Indian industry but the standardisation work has also contributed to economy in Government expenditure on stores without lowering efficiency.

The importance of exhibitions, in general, is universally admitted. It was considered that Indian industries could benefit considerably if an exhibition of the more important of India's manufactures was organised at a central place. Such a representative collection of articles manufactured in India was expected to bring prominently to the notice of Consuming Department and the public generally, the range of manufactures and standards of quality attained by the various industries. It would also demonstrate in a very practical way the industrial development which was taking place in India in recent years. In fact, besides being of educative value to buyers, such a collection would be instructive to those interested in the industrial progress of the country. With this end in view, Sample Rooms were established in 1941 at principal industrial centres throughout the country, *viz.*, Lahore, Madras, Karachi, Cawnpore, Calcutta, Bombay and Delhi.

The work done by the Inspection Organisation was no less important in the industrial field. Inspection officers came in close contact with large and well-organised firms having extensive financial resources and small concerns precluded from obtaining modern equipment and specialist staff for financial considerations. Though the larger manufacturing concerns did not as a rule, require much technical assistance, the advice that they received from the Inspectorates often resulted in the widening of their activities. In the case of the smaller manufacturing concerns, assistance had to be given by close attention during manufacture, by constructive criticism and by bringing their products to the notice of the purchasing officers. This close association of the Inspectors with the processes of manufacture in all its stages often protected the smaller firms from involving themselves in serious difficulties and thus not only prejudicing their own future but giving a bad name to the industry.

Besides the above measures, Government provided every possible material assistance to the industry. Every effort was made to get the industry all raw materials at controlled rates and licences and priorities in regard to transport, etc., were recommended. Provincial, Indian States and Overseas Governments were approached to give assistance wherever a manufacturer needed any such help. It was also found necessary to assist industry by providing balancing plants. In some cases where the industrialists were hesitant to invest capital on new ventures or on expansion of old ones for the production of urgently needed war stores owing to uncertainty of post-war prospects, Government gave promise of post-war protection against unfair competition. Examples are Bichromates and Calcium Carbide.

In many cases, firms were hesitant to undertake expansion at their own expense as they were doubtful about the future peace-time prospects of marketing the additional production. In such cases, Government gave capital assistance and the assets paid for by Government invariably continued to be the property of Government but in certain cases outright contributions were made where the assets created were indistinguishable from existing assets or could not be properly segregated and to avoid the uncertainties of post-war disposal.

Capital assistance provided by Government to industry generally fell under the following two heads:—

- (a) Factories erected partly at Government cost.
- (b) Extensions of existing private factories financed by Government.

As regards (a) examples are installation of Finishing Mills at Steel Corporation of Bengal; Messrs. Alcock Ashdown & Co., Karachi (New shops for ships repairs); Clothing Factories at Lahore, Agra, Bombay, Madras, Secunderabad, Calcutta, Delhi and Ahmedabad; Tyre Retreading and Repair Factories at Bombay, Calcutta, Delhi and Madras; Bata Shoe Factory, Batanagar and Teleprinter Pack Factory, Lahore.

Under category (b), extension of private factories financed by Government, about 160 schemes were put through and firms assisted by Government in every possible way. Important of them were B & A Railway Workshop, Kanchrapara, Extension of Machine shop of Alcock Ashdown & Co., Bombay, extension of ship repair facilities of Herman & Mohatta Ltd., Karachi, Cochin Harbour Works (Provision of Buildings, plant and machinery); Shalimar Works Ltd., Calcutta (provision of machinery); Garden Reach Workshops, Calcutta (provision of machinery); Indian General Navigation and Railway Co. (provision of machinery); Pneumatic system for Hughes Dry Dock; Machinery for H. I. Dixon, Bombay; Ahmadi Shipyard, Bombay; Braithwait Burn & Jessop, Bombay; Mackenzies Ltd., Bombay; Turner Morrison & Co., Bombay; Reconditioning and repair work to Moghul Dock entrance; Dunlop and Firestone's factory at Calcutta and Bombay; Temporary hide godown in N. W. Tannery of Cooper Allen & Co.; Ford Motor Co. and General Motors (extensions involving capital expenditure); Mysore Spun Silk Mills; Vellum Parachute Silk Co., Bangalore; Babu Jatindra Mohan Chander (Murshidabad); Government Sawmills, Chalakudi (extension to Herbert Sawmill owned by E. I. Kurivilla of A.T.T. Ltd.); Messrs. McGregor and Balfour's (Heat Treatment Centre), Calcutta; Indian Standard Wagon Co.; Telegraph Workshops at Alipore and Jubbulpore; Acme Manufacturing Co.; Angus Engineering Co.; Allen Berry Co.; Associated Manufacturing Co.; Britannia Engineering Co.; Kumardhobi Engineering Works; William Jacks, Calcutta, Bombay, Madras, Lahore; and Wolverhampton Works; Richardson and Cruddas, Bombay; Rawalpindi Engineering Works, etc. etc.

CHAPTER XXXIX

FINANCIAL ASPECT OF WAR SUPPLIES.

In a war economy, large proportions of the national income, both in terms of money and real income, must be placed under Government control to be used for war purposes. Although the programme is typically expressed in monetary terms, as requiring the expenditure of crores upon crores of rupees for the stated war programme, it is, of course, not money which wins wars. Modern wars are fought with men and materials, not rupees. That economy is successful which is able to place the correct numbers of trained men, equipped with the right kind of weapons, at the right places, at just the right times. Money in limitless quantities cannot win wars, if the necessary men and materials cannot be mobilised at the right time. Money is thus not a primary sinew of war; its proper management, however, is of the greatest importance in order to facilitate the efficient mobilisation of the men and materials—the primary sinews of the war effort. Moreover, monetary management has an important role to play in distributing as justly as possible the costs of the war effort and in minimising the dangers of social revolution. To minimise the severity of inevitable post-war problems, monetary policies during the war period itself must be efficient.

A War emergency has the effect of complicating financial arrangements and creating additional problems of business financing. War unsettles financial markets, and creates instability and uncertainty. These adversely affect the capital markets and impair the free and full flow of capital, thereby creating extraordinary problems for business which needs new capital to expand production of war goods. The war effort also requires the production of many types of goods which are useful in only the conduct of war. The production of these goods necessitates the construction of new plant and the acquisition of new equipment. The uncertainty about the continued usefulness of the plant and equipment creates an important problem, for private capital is not likely to be ventured in plant and equipment having a doubtful future usefulness. The reluctance to invest must be overcome by the provision of special inducements which will lead private investors to assume risks. Otherwise new means of financing must be provided.

Thus there are two aspects to the subject of financing the production of war goods. In the first place, since war materials are produced primarily for the government, it is necessary to provide the government with the funds required to pay for the goods purchased. In the second place it is necessary to finance the particular business enterprises engaged in the production of these goods. The satisfaction of each of these needs raises many problems. Under peace-time conditions, the financing of new enterprises, expansion of existing facilities and working capital needs involve, numerous considerations. The choice of securities to be issued, the receptive conditions of the capital markets, the outlook for the enterprise and the relationships with banking institutions are among the factors which determine the extent to which successful financing can be accomplished. Private capital is not forthcoming when there is an emergency. Emergencies must, therefore, be met by generalised assumption of risk and co-operative effort expressed through the medium of government action.

The increased war expenditure can only be financed partly by increased taxation and partly by increased borrowing. Although there are many reasons for stressing taxation in time of war, it has got its limitations and is recognized to be both economically and politically impracticable to finance the whole programme of war. The financial machinery of Government is the only mechanism which can be used to accomplish certain ends, for example, the

acquisition of sufficient revenue to finance the Government. This machinery has to be used along with other devices such as rationing, priorities, and controls to attain certain objectives which become the responsibility of the Government. First the Government has to acquire enough revenue to finance the war programme. The financial machinery can also be used to direct resources from peace-time to war-time production. Taxation and borrowing may be used to avoid some of the maladjustments which tend to accompany the process of conversion of productive facilities to the manufacture of war material. Broadly speaking, only three institutional financial instruments are available to the Government with which it can reach the objectives outlined above. They are (1) Paper money and currency manipulation, (2) Taxation and (3) Borrowing. Thus a war may be financed by a well-planned taxation system, individual bond sale programme, inflationary means or rigid Government control over economic activities so that Government may tap the resulting unspendable consumer finance.

All the above general considerations applied to India as well as other countries. In India the position was further complicated as in addition to the stores which India produced for her three services, she also manufactured such articles, for the use of United Nations in various theatres of operations, payment for which was arranged through H.M.G. in sterling. A large percentage of the population was on or below the poverty line and the opportunities for expansion of State revenue were limited. Necessary economic data and revenue administrative machinery to cope with the complexities of modern war time taxation were lacking. Still, however, taxation was resorted to for finding additional revenue to a considerable degree.

The staggering figures of war purchases naturally raise the query, how these were financed. In this connection it is necessary to refer to the Financial Settlement concluded in 1939 between H.M.G. and the Government of India. The Settlement was primarily in regard to the allocation of Defence expenditure between the two Governments, but as expenditure on Supply in its widest sense—the production of guns, ammunition, armoured cars, clothing and miscellaneous stores of every description (some 60,000 items)—was closely related to direct Defence expenditure, it was also covered by the Financial Settlement. Allocation of Defence expenditure between H.M.G. and the Government of India was fixed up under the Financial Settlement. India was to pay:—

- (a) the pre-war normal budget for effective charges of Rs. 36.77 crores;
 - (b) a sum in adjustment of the normal budget for rise in prices;
 - (c) the cost of "Indian War Measures", i.e., such war measures as could be regarded as purely Indian liabilities by reason of their having been undertaken by India in her own interests;
 - (d) a contribution towards the additional cost of her external defence.
- India paid a sum of Rs. one crore on this account.

H.M.G. was to pay for the remainder of all general Defence and Supply expenditure incurred by India, subject to separate postwar negotiations concerning the liability for surplus war stores in India acquired in common interests. Non-effective charges were to be dealt with separately. India was to pay for whatever she took from Indian production for Indian war measures including storage charges and H.M.G. to pay for and own all the remaining stores produced together with practically all the capital assets created for the purpose of storage. In actual practice, the majority of war measures in India were not, in the nature of things, taken solely in India's interests, nor solely in the interests of H.M.G., but in the joint interests of both—examples are, some items of expansion of General Headquarters, creation of Naval Bases in India both for India's vessels and those of Royal Navy, scheme for the expansion of the Army in India which may be used overseas. Cost of such

joint war measures was to be divided according to certain principles under the Financial Settlement. As regards supply measures, India provided one-half of the capital required and was to own all the assets created. Capital expenditure amounting to crores of rupees was incurred by H.M.G. in India in implementing certain recommendations of the Chatfield Committee. H.M.G. met half the capital expenditure on measures of industrial expansion including those recommended by the Roger Mission. India paid the other half of the capital outlay and retained complete ownership of the assets so acquired. Moreover, no part of the expenditure incurred in the employment of Indian troops in the Far East or in Burma was debited to Indian revenue.

The defence expenditure of India (net revenue expenditure) increased from Rs. 46.18 crores in 1938-39 to Rs. 49.54 crores in 1939-40, Rs. 73.61 crores in 1940-41, Rs. 103.93 crores in 1941-42, Rs. 214.62 in 1942-43, Rs. 358.40 in 1943-44, Rs. 397.23 crores in 1944-45 (revised) and to Rs. 376.41 crores in 1945-46 (revised). The war expenditure incurred on behalf of H.M.G. and recoverable from them upto 31-3-46 amounts to Rs. 1,902 crores as follows:—

Crores of rupees

1940-41	}	205.00
& 1941-42		
1942-43		306.00
1943-44		447.00
1944-45		455.00
1945-46		489.00

The finance required for the British Government could only be found by borrowing. The Indian Government tried its best to raise the required rupee finance by additional borrowing from the Indian public. The progressive total of loans issued since the beginning of the war up to the end of January 1946 reached the figure of Rs. 1,178 crores. But they could not wait till the loan proceeds came in, while the rupee finance required was urgent and continuous. Government, therefore, resorted to the easy method of getting their sterling receipts converted into rupee finance through the agency of the Reserve Bank. In other words, the sterling received from the British Government was sold to the Reserve Bank who paid for the same by issuing additional rupee currency. Thus, instead of the rupee finance being obtained by transfer of purchasing power from the public, additions were made to their purchasing power in the course of finding rupee finance for the British Government's requirements. This meant a transfer of resources from the public to the British Government, a gigantic, country-wide national loan to the British Government against the backing of sterling securities deposited with the Reserve Bank of India. An approximate idea can be had from a study of the sterling resources acquired by the Reserve Bank of India since 1939. The total sterling holdings of the Reserve Bank stood at pound 1,258 million on 31-12-1945 and it was estimated that the total holding on 31-3-46 would be of the order of pound 1,330 million.

It must be admitted that India has gained in a very real and tangible fashion as a result of the gigantic supply enterprise in which she was engaged. How she may ultimately decide to use her sterling assets forms no part of this study—for the purpose of which it is sufficient to note their existence. A substantial part has been employed for the repatriation of India's sterling debt and the rest has accumulated to India's credit. It is pretty clear that the British Government, in other words the British tax-payer, has footed a large proportion of the Supply and Defence bill in India. A further factor in the situation was the curtailment, owing to the war, of British exports to India. This combined with continued Indian imports to the U.K. on a large scale will ensure India's future as a creditor nation for a long time to come.

CHAPTER XL

WAR SUPPLIES—INFLATION AND ANTI-INFLATION MEASURES BY THE SUPPLY DEPARTMENT

Before giving details of the anti-inflationary measures adopted by the Supply Department, it would be desirable to say a word as to how in a war-economy inflation is caused, and prices rise. When war breaks out, there is tremendous Government demand for certain types of goods and these have to be met within the shortest possible time. The impact of Government buying on prices makes them shoot up. Various organised groups seek higher prices and rates for their goods and services. Rising prices result in higher costs of war supplies and Government has to throw out more money into the market which causes the inflation; rising prices—rising costs—rising prices to set in. His Excellency the Viceroy stated the problem in his address to a joint sitting of the Central Legislatures on August 2, 1943 in the following words: "One of the main problems which has to be faced by a country at war is the control of inflationary tendencies. In the switch over from a peace economy the mounting scale of Government expenditure inevitably increases the volume of incomes, while the goods and services available for civilian consumption inevitably contract. To accentuate the resultant loss of equilibrium between free purchasing power and the opportunities for its use, the possibilities of import become gravely restricted by the scarcity of shipping and reduced transport facilities. In any country a situation of this kind calls for the maximum effort of vigilance and control, if chaos is to be avoided".

All the above general influences worked in India, but not all of a sudden. During 1940 and 1941 India was only getting into the stride of her war effort. The Defence Forces were expanding and the Supply Department was diverting more and more of India's industrial output to war purposes. Nevertheless the country's economy remained fairly sound till about April, 1942. The outgo of Government expenditure was no more than the country could absorb. Prices too rose only 40 to 50 points above September, 1939. In 1942 the picture changed. The Supply Department's output of war-like stores of all sorts reached the dimensions of a flood. The R.A.F. arrived suddenly in our midst in large numbers and a vast programme of capital works had to be put through on their behalf at great speed. As a result the outgo of Government expenditure assumed colossal proportions, moreover, the shortage of world shipping grew more and more acute; our Far Eastern sources of supply were lost, and imports into India of consumers' goods for the civil population were reduced to a trickle. So more and more money was being poured into the pockets of all classes of consumers but the goods on which they could spend their money were dwindling away, because civil stocks were getting exhausted. A sharp scramble for commodities set in and prices began to rise and from 145 in May 1942 the index rose to 245 in June 1943.

In the same year the morale of the civil population had been severely shaken by events in the Far East. At the same time internal political unrest was rife, culminating in extensive civil commotion, in August 1942. Public confidence in Government currency was at a low ebb. Public transport for the movement of civil supplies became very difficult to obtain owing to congestion on the transport system. Hoarding of all kinds of commodities from small coin to food set in, and for the first time India became faced with a general shortage of food. At the same time demands for increases in wages

and salaries became insistent. Primary commodities—food and clothing in particular—became increasingly difficult to obtain and their prices continued to rise. So India finished up the year 1942 with the stage all set for inflation and the spifal had already begun to move.

The position grew worse and worse. The ordinary necessities of life for India's masses, such as cotton piece-goods, fuel, kerosene, iron, drugs and even foodstuffs reached the scarcity limit. Prices rose to giddy heights.

It was felt that if India's civil economy collapsed, India's war effort and the war effort of the United Nations would suffer. During war-time the Government of India's expenditure on defence increased to several times of what was spent during peace-time. For war supplies made to overseas countries, India got credit in sterling. Could this sterling be used by Government of India or by the Indian community at large to import goods of all sorts from England or from other sterling area, there would technically be no inflation. But for obvious reasons it could not be used. The remedy naturally lay in mopping up of the excess purchasing power and increasing the supply of consumers' goods. A number of important measures were brought into force in 1943. There were heavy reductions in the demands for the Defence Services; screening of Defence and Overseas demands; curtailment of programmes of capital expenditure; introduction of measures in connection with Excess Profit Tax designed to limit the amount of idle funds in the hands of industry awaiting the tax gatherer; limitation of bonuses and commissions and of stocks of stores and raw materials; control over issue of capital and floatation of new companies; and the introduction of a scheme of rationalisation and control of cotton and the Cotton Textiles Industry designed to increase production and reduce prices. The Financial Adviser (Military Finance) addressed Military Commanders and suggested curtailment of demands, elimination of waste, encouragement of salvage etc. A general tightening up of Treasury Control over all expenditure was resorted to. The Supply Department had to take special measures. It was authorised to query excessive demands. A vigorous drive towards closer control over prices paid for war supplies and in particular over profits was inaugurated about October, 1943. It was felt that an excessive margin of profit operated as one of the most formidable inflationary factors. As Government was by far the biggest purchaser of goods during war-time, a lowering of prices paid by Government could have direct and quick effects on general price level. All interests involved—Indentors, the Supply Department and producers—were invited to co-operate wholeheartedly to this end, at every stage, as a duty essential for the efficient prosecution of the war. Indentors were informed that the real degree of urgency of any order should be rigorously scrutinised. The number of demands for urgent operational purposes should be cut down to the minimum. Instructions were given to the Purchasing organisations that, wherever reasonable prices could not be obtained, Indentors should be advised to postpone purchases; in suitable cases, sanctions such as refusal to issue raw materials, fuel and to provide facilities for transport etc., to enforce reasonable prices should be applied; rationalisation and if necessary control should be enforced on the industries; elements of cost should be scrutinised; profit margin should be brought down to a reasonable level and price for requisitioned goods should be fixed on a reasonable and not on inflationary basis caused by unnecessary and artificial changes in ownership. Producers should be encouraged to co-operate both in the fixation of reasonable prices and in maintaining satisfactory standards of production so that capacity might be utilised to the best advantage. Capital assistance to industry needed also to be restricted.

The Government of India felt that there would be a grave risk of economic collapse if pressure on India's economy owing to the war demands was not

relaxed. They, therefore, decided to release capacity to the maximum extent possible for civil production to maintain the internal economy of the country. A Mission commonly known as Hydari Mission conceived in this spirit was sent to UK to (a) obtain relief and diversion in the load of war supplies, and (b) arrange imports (i) of consumer goods, to make up deficiencies in Indian production and supplies, and (ii) of coal mining and other equipment, mill stores spares, raw materials, etc., in order to maintain and increase India's production.

There was a progressive decline in the value of contracts during the fifth and sixth years of war due partly to the improvement in the war situation, and partly to the decision of Government to divert load to the UK. A remarkable fall was also noticeable in the pace of currency expansion as well as a break to the pace of the rise in commodity prices. These were due to the cumulative effect of the Government's anti-inflationary measures.

CHAPTER XII

CONSERVATION OF RAW MATERIALS

The loss of European sources of supply deprived the British Empire of a large percentage of important raw materials. Pearl Harbour in December 1941 led rapidly to an even more devastating loss of sources of supply. In two months the Japanese possessed themselves of 90 per cent. of the world's production of rubber, 100 per cent. of manila hemp, 80 per cent. of silk and about 60 per cent. of tin. The loss of Far Eastern resources and the stepping up of the vast American production programme produced such unprecedented problems for the United Nations that an entirely new type of international organisation had to be improvised quickly if a disastrous competition between Allies war production was to be avoided. Hence the Combined Raw Materials Board was set up in January 1942. It was given full responsibility for the planning of the raw materials effort of Britain and the United States and for collaborating with the other United Nations to ensure that their resources in raw materials were most effectively deployed to assist the common cause.

War-time shortages of raw materials, of machine tools and of skilled labour created serious problems every where. India was no exception to these problems and it was imperative for her to conserve every possible raw material if she had to contribute her utmost to the war effort. Equilibrium could not in most cases be achieved except by drastic reduction in requirements. Manufacturers as well as Government departments had to make great strides in saving critical materials such as tin, alloy steel, copper, aluminium, nickel, rubber, important chemicals and hundreds of other materials and in making the best use of the available skilled labour and machine tools. Economies were effected in various ways—by changes in design, by substitutions of plentiful materials for those in short supply, by changes in production methods, by improvements in handling and packing operations, by short cuts in manufacturing processes and by the conversion of ordinary tools to release specialised tools. Controls had to be imposed to see that all essential raw materials were directed towards war production. Instances are iron and steel, machine tools, non-ferrous metals, mica, several important chemicals *viz.*, sulphuric acid, chrome compounds etc. Import and Export licensing systems had to be introduced for all the strategic raw materials and the first priority was given to war production. All these could not, however, solve the difficulties and further measures appeared necessary.

Raw material was issued to manufacturers by Government for fabrication of Government stores. It was felt that some loss of material issued to contractors was occurring and the question of securing protection against such losses was given consideration. It was ordered that contracts providing for free issue of Government materials including plant and machinery to contractors for purposes of fabrication should contain the stipulation that the contractor should be responsible for the safe custody of all Government materials issued to him while they were in his possession and should duly account for them. He should take adequate precautions against destruction, damage and deterioration from whatever cause.

About November 1943, recoveries from private persons of articles manufactured for Government indicated that the control of Government material issued to fabricators was defective and the following orders were issued to tighten up the control:—

- (a) Steps should be taken to substitute as far as possible a system of issue of Government material on payment for the then prevailing system of free issues. In cases, however, it was considered desirable to issue Government materials free to a contractor, the

contract should provide specifically for the contractor's obligations in regard to them, and that a bond for the proper use of materials used should be executed by the contractor.

- (b) An estimate should be made of the materials required per unit of production and/or for the execution of the contract as a whole and materials should be issued only in accordance with this estimate. The need for accurate pre-estimating of the quantities to be issued was also emphasised.
- (c) If materials were issued in bulk and permissible waste could be calculated with sufficient accuracy, a routine accounts check should be established.
- (d) In important cases where serious leakage or fraud was feared, physical control over materials at contractor's premises might be carried out.

The above considerations also applied equally to contracts involving the utilisation of Government materials issued on payment. The CGI issued instructions to his staff requiring them to observe, as far as possible, the consumption, wastages, substitution of bazar materials for Government materials etc. Accounts Officers too played a complementary role in checking the quantities of material issued with the quantity authorised for the production actually planned and by watching the disposal of the resulting scrap.

It was ordered in April 1944 that acceptances of tender should invariably specify the quantity of the materials, if any, to be supplied by Government and if the requisite materials were to be drawn from bulk issues already made, the permissible quantity for the particular contract and the number and date of the order authorising the bulk issue should be stated in the acceptance of tender.

With the issue of the above orders regarding the control of materials supplied to contractors, a whole-time Materials Economy Officer was appointed in June 1944 to assist the Directors General in carrying out these general instructions. His functions were co-ordination and control of all measures for the conservation of raw materials and the elimination of waste, whether by modification of specifications or by the improvement of utilisation methods or the prevention of leakage. He examined all important current contracts in which materials, especially controlled materials, had been or were proposed to be issued to contractors either at controlled prices or free of cost, paying special attention, in such examination to the scales of issue, how they compared with the actual usage, and what they should be on the basis of efficient operation, the wastage rates and the disposal of the scrap arising. A Control of Materials (Issued to Contractors) Order, 1944 was issued to enable the Materials Economy Officer to secure entry into the premises of contractors and any information required by him in the discharge of the above duties.

The Materials Economy Officer examined several big contracts and many cases came to light. For instance, in some cases the contractor accepted a price of an article even below the cost of raw materials. It only meant that the contractor was making hidden profits. In many cases contractors utilised scrap and kept virgin metal issued by Government for sale elsewhere.

Some of the important investigations carried out by the Materials Economy Staff are given below. According to the Structural Directorate, 2½% average wastage in the contracts was one of the basic principle governing negotiated contracts for structural steel work and was used for the purpose of payment, though actual percentage varied from job to job. Investigations on Twin Nissen Huts showed that the actual wastage was below 2½%. Excepting T. G. sheds, wastage of structural work was under 1%. In case of bolts manufactured by Messrs. Guest, Keen and Williams in their Calcutta factory, wastage allowance varied from 25 to 67 per cent. Investigations based on physical

checks and theoretical calculations showed that actual wastage figures were very low indeed. In regard to electric fans, large quantities of non-ferrous metals had to be recovered as a result of examination. In case of Cutters M. S. Split for C. I. Sleepers, it was found that ten per cent. wastage was being allowed though actually five to seven per cent. was ample. In case of Tie Bars, it was suggested that wastage of 3' on the rolled section per billets should be stopped and billets should be cut to dead lengths as required thus resulting in saving of steel and coal. In case of Carts Hand, wooden wheels were replaced by steel wheels and a general purpose cart was substituted for special types of carts. In several cases, the size of the sheet provisioned was uneconomical and a judicious selection of size saved as much as 25% of the material. Suggestions were made to modify the size of Baths Tube Oval and this resulted in economy of material to the extent of 12% of the original requirements. About 25 tons of sheets were saved on a single contract for 10,000 Bath Tube. The utilisation of scrap and salvage in Ordnance Factories was intensified.

Savings were also effected in items like Axes Felling (Drg. I. M. 1936), Implements Entrenching Heads, Hammers Sledge, Hammer Keying Plate Layer 7 lbs., etc. Wastage percentage was reduced in items like Drive Screws 3" x 1/2" Sanitary Fixtures and Brass Bungs for Drums 5 gal. Oil Mk. III. It was found that the aircraft scrap contained, apart from aluminium alloy sheets which were used, valuable materials like Ball and Roller Bearings, Stainless Steel Tubes, etc.

In case of 25' steel life boats for Tankers, it was observed that wrong size sheets were being used resulting in a wastage of over 50% and that a suitable size sheet could reduce the wastage from 50% to about 10%. Similarly, the wastage allowed for 60' steel welded pontoons varied from 12 to 14%, but actual wastage was merely 2½% and it was then allowed. Wastage of 20% in case of hooks brass 2' was considered excessive and was considerably reduced. 52.5% was allowed as wastage in wax over the specified quantity. On examination it was found to be only 8%. Similarly in case of buttons brass, etc., the wastage allowed was over 60%. After investigation it was reduced to 20% with a proviso for further reduction in large contracts. The quantity of steel and coal issued for the manufacture of knives cook. table, clasp, etc., was reduced by 6½ to 12%. In case of Scissors shop for which there was a big demand, there was a considerable wastage of steel which was reduced on examination from 17 oz. to 6 oz. In the Harness and Saddlery Factories also, it was found possible to use some economical methods of production in case of hooks panel, buckle Iron R. D. 1", hook trace shackles, etc.

CHAPTER XLII

CIVIL ECONOMY—MEASURES TO SUSTAIN—HYDARI MISSION.

No nation has enough resources to satisfy both civilian and war demands for goods in the quantities desired; so available productive facilities must be devoted to the manufacture of essential civilian and war goods only. The ordinary functioning of the peace-time economic system cannot be relied upon to reach this goal. Nations, therefore, when threatened with war, or actually involved in war, must subject their economic systems to ever-widening governmental controls. The imposition and exercise of these controls to meet the needs of war result in a war economy as distinct from a peace economy. The foremost goal of the peace-time economy is the profitable production of goods in sufficient quantity to satisfy the wants of man. The object of war economy however, is the maximum production of goods which will ensure success in the war effort. Military victory and not the satisfaction of civilian wants is the final goal. It is, of course, necessary to continue the production of civilian goods, but such production is limited only to the extent that it is necessary to maintain civilian health and morale.

When the economy of a country such as India is called upon to produce a huge volume of armament and other goods for military use, it is like dividing a great river and causing a large part of the water to flow through a new channel to a new outlet. This process generates influences which exert great pressure on civil economy and commodity prices. A war economy is a disrupter of the forces that prevail in normal peace-time. The demand for materials to feed total war, places many strains upon an economy which generally do not appear in peace-time. It is impossible for a nation with a free economy to shift overnight from the production of peace-time materials to the manufacture of war supplies without disrupting the prevailing price and production structure. Coupled with the physical problems of change over from making products for peace-time consumption to war materials is the shortage of time allowed for the change. The problem is to reach maximum war footing in minimum production time.

When war breaks out, Government demands for certain types of goods increase enormously and the impact of Government purchases makes prices shoot up. Rising prices result in higher costs of war supplies and Government has to throw out more money into the market which causes the inflation—one of the worst enemies of civil economy. The mounting scale of Government expenditure inevitably increases the volume of incomes, while the goods and services available for civilian consumption inevitably contract. To accentuate the resultant loss of equilibrium between free purchasing power and the opportunities for its use, the possibilities of import become gravely restricted by the scarcity of shipping and reduced transport facilities. A situation of this kind calls for the maximum effort of vigilance and control.

All the above general influences worked in India but not all of a sudden. During 1940 and 1941, India was only getting into the stride of her war effort. The country's economy remained fairly sound till about April 1942. Prices had also not arisen much. But in the latter part of 1942 the picture changed with the change in the military strategy. Defence Services also expanded. There was a large expenditure on building programmes. Added to the general shortages, shipping grew more and more acute, our far Eastern sources of supply were lost and imports were reduced to almost nil. A sharp scramble for commodities set in and prices began to rise tremendously.

In the same year the morale of the civil population was severely shaken by events in the Far East. Added to this was the internal political unrest.

Heavy inroads were made in the country's industrial, transport and power resources. As was to be expected, hoarding began to be resorted to and almost all kinds of commodities from small coin to food disappeared from the market with the result that the masses were faced with an acute shortage of goods and cloth. The situation grew worse and worse. The ordinary daily requirements such as cotton piece-goods, fuel, kerosene, iron, drugs and even foodgrains reached the scarcity limit. Increasing military demands had to be met and caused the civil market to be almost starved of essential commodities.

Several measures were taken to combat this evil. Anti-inflationary measures were adopted to stop surplus money which was pouring in the public pockets to be squandered unnecessarily, thereby causing more inflation. Capital expenditure was curtailed wherever possible. Excess Profits Tax was designed to limit the amount of idle funds in the hands of industry awaiting the tax gatherer. Bonuses were limited. Capital Issue Control was introduced thereby checking the over-issue of capital and flotation of new and bogus companies to exploit the public. Rationing and controls became the order of the day. Food rationing was extended to big towns. An anti-Hoarding and Profiteering Ordinance was issued and all the dealers in certain consumers goods were required to sell at controlled prices and display the fixed prices prominently. A Screening Committee was established to scrutinise Defence and Overseas demands to see that they did not cut too deeply into the civil requirements of the country.

In spite of the above measures, about the middle of 1944 it was felt that the civil economy was almost at the point of breaking down. Since September 1939, India had progressively taken more and more from her civil economy to meet Defence Requirements. The position for some years past was that she had given up to these (1) the whole of her mill production of woollen textiles; (2) the whole of her factory production for footwear and leather manufacturers; (3) the whole of her organised output of timber; (4) nearly 75 per cent. of her steel; (5) about 75 per cent. of her cement and (6) over one-sixth of her mill production of cotton textiles in addition to a 600 million yards quota of exports. Movement of military personnel and stores over-strained the transportation system and the shortage of coal imposed severe restrictions upon indigenous production. In addition during 1941-44 imports shrunk and there was a great shortage of consumer goods like kerosene, brassware (for domestic utensils etc.) This paucity of civil supplies accompanied by a vast expansion of Defence and Supply expenditure led to a great increase in currency, purchasing power and prices. The large increase in the number of Europeans and Americans with greater purchasing power than the ordinary Indian aggravated the situation. The hardships were progressive in their intensity and the brunt of it fell on the poorer elements of the population.

HYDARI MISSION

Further about the end of 1944, the Government of India were asked whether India could take the load involved in the decision that India would be the base of operations against Japan. The Government of India made it clear that no further substantial increase in over-all quantum of war demands on India's resources could be met without grave risk of economic collapse and that an early lightening of her present burden by the release of vital civil needs of certain types of supplies and productive capacity appropriated for war purposes was essential in order to counter-act the unhealthy tendencies. They added that they could accept the load but only if certain conditions were fulfilled. To implement these conditions, a Mission widely known as Hydari Mission consisting of representatives of the Supply, I. & C. S., and Military Finance Departments and M.G.O. under the chairmanship of Sir Akbar Hydari was sent

out to the U.K. early in 1945. The conditions that the Government of India laid fell under four main heads:

- (a) import of foodgrains;
- (b) import of equipment to improve India's transportation system and increase her production of coal and of foodstuffs;
- (c) import of increased supplies of consumer goods;
- (d) assistance to her civil economy from her indigenous production by diverting a substantial part of the load particularly in textiles (cotton and woollen), leather, timber, steel and cement.

The Mission remained in the U.K. for about 2 months and carried on negotiations with the Departments concerned of the H.M.G. The Mission sought relief under the following heads:—

- (a) reduction in the demands of the Defence Services on Indian production, thus making the production so released available for the civil consumer in India;
- (b) Imports of such consumer goods as were either not produced at all in India or were produced in insufficient quantities;
- (c) procurement of raw materials and working stores required for the manufacture of consumer goods in India; and
- (d) expediting the procurement and dispatch of equipment and stores ordered by the several deptts. of the Government of India in aid of the war effort or the maintenance of civil economy.

Considerable headway was made in regard to the last mentioned item, viz., stores, equipment and machinery already ordered or about to be ordered, such as coal mining machinery, transportation stores, road rollers, cranes, telephone equipment, agricultural machinery, fertilisers etc. As regards requirements of finished consumer goods and raw materials and working stores required for the manufacture of consumer goods in India, the results obtained were satisfactory. Increases under these heads from all sources over the 1944 figures were to reach about Rs. 26 crores in 1945 rising to Rs. 48 crores in 1946. Of this, half of the amounts mentioned represented the cost of raw materials and working stores required for the manufacture in India of consumer goods, viz., mill stores dye stuffs, knitting wool, woollen yarn, tin-plate, umbrella and bicycle components, industrial chemicals etc. The finished consumer goods included such items as baby foods, vegetable seeds, bicycles, drugs and medicines, paper and stationery items, cotton sewing thread, sewing machines, toilet requisites of all kinds, hardware, glassware, electric household goods etc.

Of the several heads under which relief was sought, the more important were steel, leather, timber, woollens, cement, and cotton textiles. The net result of the relief obtained under all these heads in 1945 was about Rs. 4 crores and was expected to about Rs. 70 crores in 1946 and of these the most important single item under which relief was obtained was cotton textiles. In 1945 India was liable to supply up to 800 million yards of cotton textiles towards the requirements of the defence services and to export 600 million yards, making a total deduction from what was available out of the mill-made cloth to the Indian consumer of 1,400 million yards. The expectation was that the civil consumer in India was to receive a substantial addition in 1945 and 1946 to supplies of all kinds.

Soon after the Mission's return, however, the European war ended and was followed by Victory over Japan, War demands came down and the pressure from civil economy was gradually released.

CHAPTER XLIII

INDUSTRIAL RESEARCH AND ITS AID TO WAR SUPPLIES: DEVELOPMENTS OF SUBSTITUTES.

There have been many remarkable developments in diverse fields of human activity during the Second World War, but in no other sphere, perhaps, were they more marked than in the realm of science. Owing to economic blockade, restrictions on shipping space and a host of other difficulties, such as the necessity to conserve the currencies of particular countries, etc., almost all the belligerent nations attempted to make use of on an extensive scale substitute materials in place of imported ones. During the first World War, and, again, in the course of the second, confident prophecies were heard that one of the belligerents would be forced to cease fighting at some given date owing to exhaustion of some essential raw material. That this has not happened is due, in large measure, to the facilities which modern industry gives for the production of substitutes. It is common knowledge that, in spite of complete isolation from the world for six years, Germany and its satellite States did not show signs of exhaustion from the economic point of view, although the contrary was the case from the military view point.

In a country like India which nature has provided with ample raw materials, the need for substitutes may seem a strange anomaly. War demands, however, made tremendous strain on the industry and due to shipping difficulties, articles which used to be imported could no longer be imported. The result was that India had to fall on her own resources. "Necessity is the mother of invention", and if an article of necessity cannot be had, one is forced to use a substitute. Examples can be given of many substitutes which were developed and are being commercially utilised. It is not always easy to draw a line of demarcation between substitutes and individual new products and on occasions they have been somewhat confused with one another for obvious reasons.

It may be borne in mind that one cannot resort to substitutes in all cases. If a country has, for instance, no copper or nickel, it can only obtain them by importation. No industry can produce an element, whether one of the metals or a non-metal like phosphorus by an artificial process, but compounds such as petrol, rubber, ammonia, or plastics may be made artificially where coal or oil is available, or where there is a flourishing agricultural industry, provided that power can be obtained. Thus, carbon required may be derived from coal, petroleum, or plant substances, and hydrogen by the inter-action of coke and water, nitrogen from the air, and modern chemical technology can produce from these a vast number of materials which often replace others formerly imported.

Scientific research is the foundation of all the industrial progress and economic advance generally which the world has witnessed during the last 150 years. The social effects have been tremendous. It is doubtful whether the general public know the extent to which science was harnessed to the production of munitions and other stores during the war years. During the last six years, phenomenal progress in research has been made by the mobilisation of the scientific talent of both the Allied and Axis camps and this has intensified the trend towards substitution of materials in manufacturing processes, introduction and extension of the use of synthetics, and, last but not the least, the harnessing of energy from the disintegration of matter. The evolution of the atom bomb is the latest achievement of scientific research with vast potentialities.

Like so much else in the field of "Supply", scientific research is a specialised activity and even those who are most intimately concerned with the

mounting totals of output are not infrequently unaware of the debt they owe to the unobtrusive worker in the laboratory and the test house. It is the purpose of this short chapter to provide the reader with a brief description of his not inconsiderable war-time achievements in this country.

Before the Second World War, Government did not take any active interest in scientific research. The principal scientific research institutions under Government auspices were the Lac Research Institute, Jute Technological Laboratory, Cotton Technological Laboratory, Harcourt Butler Technological Institute, Kerala Soap Institute, Bengal Tanning Institute, etc. In 1940, the Government realised the necessity for industrial research in the face of war-time shortages and the dire need for the mobilisation of the country's resources for the prosecution of the war. The Board of Scientific and Industrial Research was created in April 1940 and owes its inception largely to the enthusiasm of Sir Ramaswami Mudaliar, the then Commerce Member. Subsequently a Council of Scientific and Industrial Research was also established. During war years, the Board has been the guiding and co-ordinating authority. It generally maintained close touch and liaison with the Supply Department and directed its researches to discovery and evolution of new stores for which the Supply Department received demands but could not locate capacity.

Over 200 research problems were investigated by the Council and it made many outstanding contributions to Indian industry and to the scientific side of the country's war effort. A few of these may be mentioned by way of illustration.

The gigantic proportions which the war assumed brought about acute shortage of metals all over the world and more so in India. Plastics replaced metals in many industries and brought about a great many improvements. In America, England and Germany plastic materials were made of synthetic resins. The raw materials required for many of these resins could not be produced in India in any appreciable quantity. Indigenous resources from which plastics could be produced were investigated and various successful processes were developed. Jettison tanks and petrol proof plastic containers were prepared out of jute and shellac; Bagasse plastics were developed for the fabrication of building materials; shellac and jute went into the manufacture of fibre boards, non-metallic containers, identity discs and insulating materials; Horn waste plastics were worked out for electrical appliances. Collapsible tubes were made from castor oil and tailor wastes; enamels, lacquers, varnishes and plastics were developed out of bhilawan or marking nut; vegetable oils were investigated for the manufacture of oil plastics.

India is the largest producer of vegetable oilseeds. The war cut off the overseas market for the country's produce and threatened the oilseed trade. The development of vegetable oil lubricants and internal combustion engine fuels out of the vegetable oils marked another step in the utilisation of the country's resources for various industrial needs. Thousands of gallons of vegetable oil lubricants were produced in the country as a result of these researches. The results were made known to China and it is presumed, the Chinese made good use of these vegetable oil lubricants.

In the field of drugs and dyes, the failure of imports from abroad resulted in the initiation of research projects for the utilization of the country's indigenous resources. Glandular products were prepared from slaughter house wastes. Atoxyl and carbarzone were synthesised from easily available raw materials. Various vegetable dyes were extracted from the country's forest wealth.

With the establishment of closest co-operation between the Council and the Defence organisations of the Government, the R.A.F. and the U.S.A.A.F., many problems of immediate importance to the prosecution of the war were tackled by the Council in its laboratories. A successful formula was worked

out for the manufacture of anti-gas cloth from entirely indigenous materials and the formula was revealed to other Allied countries. Large quantities of this cloth were manufactured in this country. High tension ignition cable-testing device, slushing varnishes for petrol storage metal tanks, patching cement for the repair of rubber tanks, petrol-proof hose-pipes, petrol containers, petrol pump diaphragms, petrol tank sealing compositions, smoke candles and distress signals, hot food containers, water detecting compositions and shock proof packing materials from cocoanut fibre, were all worked out for the Air Force; pyrethrum cream and pyrethrum emulsifiers were prepared for all armed forces in the South East Asia theatre of war. Air foam fire extinguishers and luminous paints and pigments developed in the Council's laboratories were extensively used in defence operations. Several scientific devices were developed for the military intelligence section.

Many more industrial processes such as synthetic fibres from oilseed cakes, particularly ground-nut seed cake, chemotherapeutic products from vegetable sources such as Nim, Brahmi, Kakra Singhi, Bhilawan etc., Producer-Gas Plants, semi-synthetic tanning materials, insecticides from indigenous sources, rubber from other plant sources and utilisation of natural resins have been investigated to reinforce the country's war effort on the scientific side. At the initiation of the Supply Department Agar-Agar was prepared from weeds at Chilka Lake and aircraft dope from waste films.

India must take a lesson from the highly industrialised nations of the world in the matter of scientific research. A plan of industrial development must provide a proper place for scientific research because of its insurance value. It is fruitless to discuss whether research should precede the establishment of industry or *vice versa*. A scheme dovetailing scientific research into the operation of industries is the need of the times. At the same time research in pure sciences should also receive support because of its unanticipated repercussions on new products and processes. The Report of the Shanmukham Chetty Committee on Industrial Research Planning has provided the basis for action in the matter of scientific research development and it is hoped that in the near future both at the centre and in the provinces, scientific research will receive adequate encouragement, and that such research will be utilised more and more for development of India's extensive resources.

CHAPTER XLIV

WAR SUPPLIES AND MAN POWER

(a) **Introductory.**—In as-much-as man power is the only animate factor of production, it occupies an especially strategic and vital position in fulfilling the plans and requirements for a nation's war production programme. All production processes require the application of men and machines to materials for the purpose of giving the materials the desired form, state and place utility. To increase production, either the amount of man power must be increased numerically or existing man power must be utilised more efficiently and effectively.

Success in modern warfare, because of its mechanical and technical nature, depends primarily upon the efficient productivity and technical genius of men. Civilian ingenuity and production are considered relatively more important than ever before to support the armed forces with fighting equipment, munitions and materials of war. In addition to producing for the armed forces, civilians must also manufacture as much of their own consumer goods as is consistent with the war materials programme. Therefore, the personnel of a nation which is recognised as its most important resource at all times has this importance emphasised during time of war.

(b) **Supervisory staff, skilled and semi-skilled labour.**—The population of India is about 400 million human beings but the war brought to light serious shortages as regards supply of trained craftsmen of various kinds for war industries and the technical branches of the Defence Services. Soon after the debacle of France, Government came to the conclusion that the moment had come for the conscription of certain categories of manpower. A Committee to recommend categories to whom conscription should apply was appointed as a result of whose recommendation the National Service (Technical Personnel) Ordinance, 1940 was promulgated. The Committee was also of the view that Government should make good the deficiencies in trained personnel in the munition factories and should improve the standard of technical education. A Technical Training Enquiry Committee was accordingly set up to go into these matters. It recommended an all-India Technical Training Scheme which provided for the utilisation of 16 technical institutions and the training of some 3,000 men. A Director of Training was appointed by the Labour Department to implement the recommendations and the first Training Centre was established at Lahore in January 1941. The Scheme covered all the main engineering trades including fitting, turning, machining, instrument making, welding, sheet metal work, tool making, blacksmithy, moulding, pattern making, carpentry, drawing and surveying. The trainees were tested and placed in employment by the Technical Recruiting Organisation of the Army or the National Service Labour Tribunals according as whether they were required for the services or civil industry.

In spite of the difficulties, *viz.*, lack of qualified instructors, shortage of machine tools and precision instruments, nearly 97,000 young men were trained as technicians up to September 1945 at over 500 centres. These were supplied to the Armed Forces, Ordnance Factories and civil industry.

The Bevin Training Scheme was inaugurated in 1941 with the object of giving higher technical training to Indian artisans in the U. K. at His Majesty's Government expense. The value of the scheme was immense to the individual trainee and to India's industrial progress. This scheme forged a new link of goodwill and comradeship between the working classes of India and of the U. K. Up to September 1945, over 700 boys were sent for training to the

U. K. and most of them were employed in Ordnance Factories and private engineering firms after completion of their training. A large number of boys were also trained as Aircraft Mechanics for C. M. U.'s.

As "labour" is the responsibility of the Labour Department the above schemes were carried out by that Department. The training of all these men could not, however, meet the requirements of the Supply Department and the various organisations in that Department had to adopt special measures and undertake their own training schemes to meet their requirements. Details are given below.

The number of staff and workmen in Ordnance Factories rose to over 115,000 in February 1945 from about 17,000 in September 1939. Special measures had to be adopted to meet the increasing demands for technical men. In the early period of the war, it was possible to meet almost all the requirements by intensive recruitment from outside sources and by recruitment in the U. K. for the more highly specialised posts. Early in 1941, however, it became obvious that the resources of junior supervision, skilled and semi-skilled labour in the country had been tapped to the full and that even the labour department Technical Training Schemes could not suffice. The existing factories had undergone and were still undergoing major expansions and a number of new installations were being created. All these demanded man-power to an increasing extent and it was realised that if fruitful results were to be achieved from this increased capacity, training of personnel in the Factories themselves would have to be undertaken. The pre-war training schemes of Ordnance Factories, viz., A.W.M. Under Training Scheme, Apprentice Training Scheme and the Boy Artisan Scheme were expanded. A new scheme consisting of two distinct sections, one the Supervisor Training Scheme spread over a period of from 9 to 12 months and the other the Artisan Trainees Scheme covering a period up to 9 months was launched. A small number of instructors were obtained from the U. K. and many others selected from the staff of the Ordnance Factories and trained in the method of instruction. Training Centres were set up at Ishapore, Dohad, Jubbulpore and Khamaria. This Scheme, in addition to supplying more than 40,000 semi-skilled grade II workmen required mainly for repetition, single operation work, met, in full, demands for a total of 1,954 supervisors, draughtsmen and estimators; more than 3,200 skilled (including highly skilled) and 7,100 semi-skilled grade I workmen.

The D. G. S. R. also experienced serious difficulty in getting suitable technical labour. The number of workmen in Shipbuilding and Repair Yards in India expanded from 8,000 in 1939 to 56,000 in 1945. The essential difficulty in dealing with labour was the important factor that all labour are Ryots or Peasants and every year they simply fade away to their Paddy Fields. This was one of the factors which accounted for absenteeism. Shortage of skilled labour was met by posting 900 Italian P. O. Ws. already in India to various Shipbuilding, Naval and Repair Yards. Chinese labour from Singapore Naval Base and other Yards in Singapore and Hong Kong was also taken for engine repair work. The European British Subjects Act 1940 under which all British European subjects became conscripted on arrival in India was also of great help. Similarly the National Service (Technical Personnel) Ordinance of 1940 proved of inestimable value in dealing with Technical Labour.

The D. G. A. also fared no better. A labour force of many thousand had to be created quickly and this force had to contain a high proportion of highly skilled tradesmen and aeronautical engineers or experts in the various trades and processes involved both on Repair and Manufacture as the standard of workmanship in aircraft is of a very high order. Training Schemes were instituted by the D. G. A. utilising the pre-war Civil Aviation Schools but as these schemes were introduced too late, they had to be closed down in favour of the Unit Training Schemes. Some 800 Skilled Chinese tradesmen stranded by the

War in Calcutta were recruited by C. M. U. No. 1 alone. The Tata Organisation trained their own labour. A special Mission was sent to England to recruit experts in the U. K. The Air Force Authorities had to be approached for help and despite their own shortages of personnel, at the height of the D. G. A. activities, some 300 Officers and upwards of 5,000 N. C. Os. and airmen were loaned to the Department.

(c) **Recruitment of Personnel for the Supply Department.**—The growth within 4-5 years of an Organisation such as the Supply Department from naught to a staff of over 17,000 on V-J Day was not unaccompanied by stresses and strains—both mental and physical. Not the least difficult of the problems was that of creating within a year or two an organisation competent to handle, not merely the task of providing arms, but also of mobilising the entire economy of the country.

A large number of Ministerial Staff had to be recruited. Special Officers had to be appointed for recruitment. Men were drawn from various Central and Provincial Government Departments in addition to fresh recruits. The demand for suitable men existed everywhere and the situation was further aggravated by the opening of several American and other offices which offered higher rates of pay with the result that many persons were resigning and shifting to other offices. The difficulty was overcome by Home Department orders under which persons who resigned one Government job could not be taken in Government service again. Another difficulty was that different grades existed in different offices. The Finance Department, as a temporary measure, introduced a unified scale of pay to meet this difficulty.

The problem of providing supervisory staff was even more serious. A large number of experts had to be recruited. The problem was, however, partly solved by conscripting experienced executives under the National Service (Technical Personnel) Ordinance of 1940 and the European British subjects Act 1940. Some men were borrowed from permanent services also. A large number of officers, however, had to be drawn from business houses whose knowledge and experience made them particularly suitable for Supply work.

Permanent civil servants are prohibited from "engaging in trade" and their wholetime is at the disposal of the Crown, the idea being that a servant of the Crown should have one allegiance only. The same broad considerations applied to temporary civil servants and the best possible arrangement was that they should, for the period of their employment under the Crown, sever their connections with their normal work, and receive remuneration from Government alone. This arrangement was, however, manifestly impossible in many cases and as the Supply Department could not perform its duties without reinforcement from business houses, certain relaxations were permitted. Most of the officers from business houses could be classified in the following categories:—

- (1) Honorary Advisers who took no decisions and performed no executive functions. These officers were at liberty to retain their business connections. They were paid an honorarium of Rupee 1/- per year and were subject to the Officials Secrets Act and Government Servants Conduct Rules.
- (2) Part-time officers whether described as Advisers or by other designations and whether honorary or paid, who in fact took decisions and performed executive functions, though not treated as whole-time members of the Department. These officers again were at liberty to retain their business connections but they were required to declare the nature and extent of their business interests.
- (3) Whole-time executive officers. The principle for this category was that all active business connections must cease for the period of the civil employment and that any "sleeping" interests retained must be recorded and approved.

It will be interesting to discuss the psychological and other effects of hurling a group of business men—many of whom had never before worked for others and many of whom were, to say the least somewhat individualistic—into an organisation designed to serve the nation and to operate for the benefit of their fellow Indians. The personnel recruited had no previous experience of working in a large Government organisation and took time in understanding and appreciating the Government methods of transacting business. However, it can be said that from this *potpourri* of personalities, from this hash of temperaments, did emerge a team determined to do its best by India. Despite occasional eruptions of temperament, despite a few early and forgivable misconceptions regarding the relationship between the civil servant, paid or unpaid, and the government, it is fitting and proper here to record that in those turbulent days, when democracy seemed to be slipping over the horizon, the rupee-a-year men and the other executives sweated seven days a week to provide, as well as within them lay, impetus to the production programme and weapons for our arms in India and abroad. No less noteworthy and no less valuable was the 60 to 80 hour a week worked by the almost entire personnel who gave their utmost in those now distant days when every minute, every hour counted. Only the future will accurately assess the value, implications, and wisdom of their work, but even now it appears that they laid the foundations of the industrial future of India.

CHAPTER XLV

COAL (PRODUCTION AND DISTRIBUTION)

It was not until the end of 1943 that signs of a serious shortage of coal began to develop. A serious fall in raisings occurred and it became necessary to ration supplies of coal. A Coal Rationalisation Scheme was introduced and rations were fixed for various consumers on the basis of coal supplies made over a period. Even this Rationing Scheme could not be fulfilled owing to the unprecedented fall in coal raisings. This fall was attributed mainly due to difficulties in labour supply and transport coupled with greatly increased demands for coal due principally to industrial expansions. The shortage of labour was caused primarily by the counter-attractions of surface works in the neighbourhood of the coalfields, some difficulties in food supply at the collieries and at the same time an excellent harvest in some of the districts from which mining labour was normally recruited. Other factors were inadequacy of colliery stores and equipment, reluctance of some owners to maintain or increase output in view of the Excess Profits Tax, excessive departmentalism in the Government of India which hampered effective action in the early stages of the coal crisis. The fact that three Departments, the Labour, the War Transport and the Railway Board dealt with various aspects of coal made it difficult to secure concerted action quickly. The appointment of the Coal Commissioner early in 1944 and of Supply Department on 1st June 1944, as the Department responsible for coal production and distribution, considerably reduced this difficulty. The presence of the Coal Commissioner and his organisation in Calcutta was extremely valuable in effecting liaison with the coal trade.

It should also not be forgotten that constitutionally the Government of India had no responsibility for coal production. This was a Provincial subject under the Government of India Act. The progress of the war, however, made it quite clear that Provincial control over a commodity of the importance of coal was not suitable for war-time conditions. Coal has been described as "not a munition of war but the munition of war", and in conditions approaching what is known as "total war", it became essential that the Central Government should have complete control over coal. Such control was not, however, taken legally until the date of the Colliery Control Order 1944, although the Government of India undertook increasing *de facto* control from the middle of 1943 onwards.

The Supply Department assumed full responsibility for the distribution and production of coal from 1st June 1944, and the measures taken by it to deal with the problems in regard to coal shortage are summarised below:—

(a) **Colliery Control Order.**—Under this Order Government began to exercise statutory powers over the production and distribution of coal and it enabled Government to issue such directions as it thought fit to any colliery owner regulating the disposal of his stocks or output of coal, fixing the price chargeable by colliery owners and middlemen, prohibiting the sub-division of and the opening of any new colliery, etc. This Order was promulgated on 1st April 1944, and was amended from time to time.

(b) **Distribution of coal.**—A Coal Rationalisation Scheme was evolved. Rationalisation was introduced in all important industries and Government orders placed with most efficient and selected units. The D. C. C.(D.) received each month from collieries an estimate of their output of coal during the next and succeeding month, and also an estimate from the Railways of the number of wagons they could make available for coal distribution. The principal consumers of coal also sent periodical estimates of their requirements during each

month. The consumers were divided into various classes in order of priority. From these estimates, the D. C. C.(D.) prepared each month a statement showing the coal to be allocated to each consumer in the succeeding month. This statement was laid before a sub-committee of the Central Priorities Board appointed under the directions of the W. R. C. C. and consisted of the Secretaries of the principal departments concerned, P. A. O. (India), representatives of U. K. M. W. T., American authorities and others concerned. The allocation proposals, when approved, were returned to the D. C. C. (D.) who then made arrangements with collieries to supply the quantity of coal required, if necessary, under the Colliery Control Order.

(c) **Price fixation.**—A notification was issued fixing the prices of coal at pit-heads. All coal in the Bengal and Bihar fields was graded into six categories according to its ash content.

(d) **Sub-division of collieries.**—The working of sub-division of collieries tended to waste both labour and transport and a provision was made in January 1945 to prohibit the working of small properties in a manner uneconomical to the interests of the country.

(e) **Statistics.**—The existing statistics were extremely inadequate and seriously hampered Government's efforts to plan coal production and distribution. The Colliery Control Order gave Government power to collect any information it wanted from colliery owners and much more elaborate forms were accordingly issued.

(f) **Schemes to stimulate production of coal.**—(i) Certain colliery owners were reluctant to produce all the coal they could, due principally to the incidence of the E. P. T. To overcome such reluctance certain concessions were offered to the Trade. These concessions took the form firstly of bonus payments and secondly of a special depreciation allowance on new machinery. Two bonus schemes were introduced and were administered by the Coal Commissioner. The first Scheme was introduced in September 1944 and took effect from 1st April 1944. Production targets for individual colliery undertakings were fixed for half-yearly periods beginning 1st April 1944 and ending 31st March 1946. A bonus was paid six-monthly to each colliery undertaking on the excess of the tonnage despatched for sale or stacked during the period over the target tonnage for that colliery undertaking for the period which was calculated on a sliding scale. This Scheme was followed by a second Bonus Scheme which was introduced in January 1945 and applied to the six-monthly target periods beginning October 1944 and ending March 1946. This scheme provided for a payment of additional bonus on total periods. These bonuses were free from E. P. T. but subject to Income Tax and Super Tax, the total payments being subjected to a maximum of Rs. two lakhs per annum per colliery.

(ii) Owing to the shortage of labour, there was a greatly increased need for coal cutting machinery. This machinery became extremely expensive and colliery owners were reluctant to invest money in such costly machinery. A special depreciation allowance for the purpose of Income-Tax and E. P. T. at the rate of 50 per cent. per annum on the written down value on all items necessary for the maintenance or increase of coal production, excluding items of stores required by way of replacement, was allowed.

(iii) Another measure taken by Government to encourage the increased mechanisation of coal mines was the placing of two very large orders for colliery plant and machinery on U. K. and U. S. A. and their following up at necessary level both in Washington and in London. The machinery ordered consisted of Coal cutters, Coal Mills, Mechanical loaders, Haulages, Pumps, Aircompressors, Transformers, Trailing Cable etc., and the value of the machinery ordered was about one crore of rupees and the greater part of the plant was delivered in 1945.

(iv) **Open Cut Coal Mining Operations.**—Early in 1944 when coal supplies were most critical the Government of India decided that the quickest method of obtaining coal was to develop open-cut coal mining. Owing to the shortage of labour the only way to develop open cut mining quickly was with the help of heavy excavating machinery. A certain amount of heavy excavating machinery available with the Engineer-in-Chief was placed at the disposal of the Supply Department together with a Mechanised Equipment Company. An officer was also deputed to the U. S. A. to procure necessary equipment and he obtained a considerable quantity of machinery costing 1.45 crores of rupees. Government also entered into a contract with a big American firm of contractors, who undertook to procure, service, and ship the machinery, and to supply a team of experts to advise Government on the manner of erecting and operating the machinery. A Directorate of Open Cut Coal Mining was constituted with effect from 1st December 1944. The principal effort was made at the Railway Collieries at Bermo, and consisted primarily of removing over-burden from the quarries and also of producing coal. A complete civil organisation to take over the operations and to relieve the Army units was built up.

It became clear during 1945 that although the coal won was of very great value at the time but the operations when run departmentally were proving very expensive. It was, therefore, decided to wind up the Directorate of Open Cut Coal Mining and a contract was entered into with a firm according to which the Company would take over the maintenance and operation of the machinery. From 1st January 1946 the Company took over full executive charge of all the operations of the Directorate of Open Cut Coal Mining and supplied all technicians, operators, workmen and others while the plant remained the property of Government, Government paying the salaries of the staff and a bonus to the Company on the total tonnage of coal delivered by the Company into wagons from open cut sites.

(v) **Labour problems.**—Although labour remained the responsibility of the Labour Department, Supply Department took an active part in conjunction with that Department in dealing with the problem. The most important measures taken were the recruitment by Government of a force of unskilled labour from the district of Gorakhpur and surrounding district in the U. P. and the lifting of ban on employment of women underground which was, however, re-imposed in February 1946. A Coal Mines Labour Welfare Fund was also formed.

(vi) **Food difficulties.**—In 1944 a scheme was introduced to ration colliery labour known as the Young Plan. The scheme was applied in Bengal and Bihar but was only given statutory effect in Bihar.

(g) **Stocking.**—As a precaution against the threat of Japanese invasion, it was originally decided to build up stocks at pit-heads in the Jharia and Kani-gunj coalfields in 1942. A scheme was sanctioned for the stacking of one million tons of coal during 1942/43, and a further million tons during 1943/44. A further scheme was sanctioned in December 1943 and again in August 1945 to stack coal. The intention behind these later schemes was that selected collieries should stack coal during the good raising months to give Government a reserve to draw on during the bad raising months in the second half of the year. The continuing acute shortage of coal made it impossible to complete these stacking schemes in their entirety.

(h) **Coal Production Fund Ordinance.**—Very considerable expenditure was incurred by Government on various measures, e.g., Bonus Schemes, Gorakhpur Labour and the Open Cut Coal Mining Operators, and it was felt that expenditure on these items should be a charge on the consumers of coal rather than on the general tax-payer. Accordingly on 26th August 1944, a Coal Production Fund Ordinance was promulgated giving Government power to levy a cess

on all coal and coke despatched from collieries in British India at a rate not exceeding Rs. 1/4/- per ton. The cess was fixed at Rs. 1/4/- per ton and up to the end of March 1946, the total cess collected was Rs. 87,144,425/-.

(i) **Acquisition and control of collieries.**—The production of coal in the fields outside Bengal and Bihar assumed for transport reasons an importance out of all proportion to their actual output. In particular coal in the C. P. and Central India coalfields became of great value. Apart from appointing a Regional Coal Controller to stimulate production, two important steps were taken in these fields. The first was the lease of the Ponri Hill colliery in Korea State for five years in October 1945. The second was the requisitioning of a group of collieries in the C. P. known as the Ballarpur Collieries in February 1945 under D. I. R. Similar control was also taken of two important collieries in the adjacent Indian States—Chirimiri in Korea and Sasti in Hyderabad. Owing to disputes between the partners the output from these collieries was, however, not as great as it should have been. As a result of the control the output was increased by about 30,000 tons a month in all the collieries mentioned above.

(j) **Fuel Economy.**—There is no doubt that a great deal of coal in India is wasted. A number of Fuel Economy Officers were appointed who visited factories and other large consumers and advised them on the means either of saving coal or of using a lower grade of coal.

(k) **Exports.**—Before the war India exported as much as two million tons of coal a year to countries in South East Asia, in particular Ceylon, Burma, the Strait Settlements, Singapore and Hong Kong. From November 1943, exports were reduced to 30,000 tons for Ceylon. In September 1944 a total embargo was placed on exports with the exception of 19,000 tons a month to the Colombo Gas Company. From early 1945 owing to the liberation of countries of S. E. A., small quantities of coal were exported through military channels from May 1945 onwards until the end of the war. All demands of coal for export were screened by the Secretary of State and exports were only allowed on his recommendations.

With the help of the above measures, the coal crisis was averted and the assistance given was of great value to the coal trade and thus to the country as a whole. Figures of production and despatches for the half-yearly periods between 1943 and 1945 are as follows:—

	Raisings	Despatches
	(in tons)	(in tons)
1943		
1st half-year	14,402,956	12,146,528
2nd half-year	11,294,751	10,702,112
1944		
1st half-year	13,652,933	11,893,924
2nd half-year	12,382,002	11,260,973
1945		
1st half-year	14,868,771	12,332,266
2nd half-year	13,907,519	12,368,357

CHAPTER XLVI

TRANSPORT—RAILWAY PRIORITIES, ETC.

The mobilisation of the transportation facilities of a country in time of war is a gigantic task. It is at once an important part of industrial mobilisation and a phase of military operations. Full use of industrial plant capacity is necessarily contingent upon the flow of materials. Production of war stores is dependent in every way and at all times on transportation. It follows that the transportation service of the nation must be adjusted, if possible, to meet the changing production requirements. The carriers must be prepared to handle new currents of traffic in any section of the country and to adjust operations as best as they can to any eventuality.

Moreover, transportation is a basic element of military strategy and an integral part of military action. Troops and supplies to and from military establishments must be transported whenever conditions require it. War means a multiplication of camps, cantonments and military bases all of which must be rapidly constructed. The commercial carriers must assume most of the burden of heavy movement of men and supplies because the motor trucks, motor cars and planes owned by the military departments are used primarily for military manoeuvres and field operations. The railways and other carriers are compelled to assume the war burden, and at the same time to continue to meet the usual peak requirements of commercial traffic.

Mobilisation of transportation in time of war, therefore, involves (1) prompt construction and conditioning of ways and equipment to meet unprecedented peak demands, (2) adjustment of methods of utilisation to ensure greater capacity and speed in handling important traffic, (3) curtailment of unnecessary service and reduction of wasteful competitions; (4) better co-ordination of all forms of transportation; (5) Legislative changes to permit better operation and adequate control and (6) adequate organisation to ensure maximum performance and adjustment to a total war of defence effort.

These problems are applicable to all countries at war and India could not be an exception. Since the outbreak of war in September, 1939, heavy demands were made on all Indian Railways, which had to make special arrangements to deal with war traffic and the supply of war materials.

Soon after the outbreak of war, it was realised that priority, preference rating, conservation, curtailment and rationing were the only possible devices to direct the flow of raw material, supplies and equipment so that they would be at the places where they were needed at the time and in the quantity required. In a war economy the ordinary operation of the economic system is not efficient in producing in the quantity and required sequence the primary needs of a military establishment. Some central authority is necessary to determine the types of goods needed, their quantities and their order of production. A system was, therefore, devised under which Priority Certificates were issued by the Communications Department (later on War Transport Department) who also distributed books of these certificates to certain Government departments, mainly the Defence and Supply Departments. These departments issued certificates at their discretion which on presentation to the station masters authorised a priority despatch for the consignments shown in them.

With the deterioration of situation in the East, the pressure of traffic on the railways was so great that many important movements could not take place without priority certificates. The result was that on the one hand, a large number of these certificates were being issued which tended to impede movements of the highest urgency, and on the other, sufficient care was not always

taken to ensure that movements for which priority was given were economical of transport. It was, therefore, essential to reduce number of priority certificates and to ensure that the authority granting the certificates was fully aware of the current traffic position on railways and was competent to distinguish between those movements which were economical of real transport and those which were wasteful. The War Transport Department appointed originally a Controller of Railway Priorities in March 1942 at New Delhi and a Regional Controller of Priorities at Calcutta. The organisation was steadily expanded to cover the whole Indian railway system and Regional Controllers of Railway Priorities were appointed at Lahore, Bombay, Madras, Calcutta West, Calcutta North and Gorakhpur, to control the principal railways. The post of Controller was upgraded to that of Chief Controller, Railway Priorities. Panels consisting of representatives of the departments of the Central Governments, and Provincial Transport Boards concerned were set up to assist the Regional Controllers. The Panel acted in an advisory capacity and screened the demands for transport before passing them on to the Regional Controllers. Priority Certificates for movements by rail by officials other than the Regional Controllers or the Chief Controller were eliminated. The Provinces established Transport Boards which dealt with general questions regarding priority for local movements by rail or by other agencies and considered the applications for movement of foodstuffs and civil supplies and made recommendations to the Regional Controllers.

All contractors, firms, companies and agencies requiring assistance in movement of raw materials, finished components or finished stores produced by them etc., against the orders placed by the Supply Department began to apply to the representatives of the Department on the Regional Panel of the area in which the despatch station of the desired movement lay on a prescribed form. He supported the application in the meeting of Panels. Apart from this rationing methods, steps were taken to eliminate all unnecessary traffic. Instructions were issued to the effect that while placing orders with the contractors, the Purchase organisation should take into consideration the destinations of the goods and see that the orders, other things being equal, were placed in that very area, if practicable, so as to eliminate the maximum possible of haulage and conserve wagons as far as practicable. Use of uncovered wagons was also recommended for stores, e.g., iron and steel, and timber.

Certain controlled commodities were supplied with wagons by means of quotas. The principle here was to link procurement and transport. It was useless for the Transport Authority to give priority to individual consignments when the Procurement Authority might say that these particular consignments were not ready or that he had other consignments whose movement was of greater urgency. A quota of wagons was, therefore, placed at the disposal of the producing authority who decided how it should be distributed and which consignments should be moved first. Examples are cement, steel and timber. In the case of the two former, regular quotas of wagons were given to the factories, who, under instructions from the respective Controllers, allotted them to individual consignments. In the case of timber, Provincial Timber Transport Advisory Committees were formed composed of Forest and Railway officials. The former screened the demands and decided the order in which they should be fulfilled. Railway officials advised regarding the most suitable railway movements, the route by which timber should move and the capacity of stations for loading, transshipment and unloading. The Timber Transport Advisory Committee placed its demands for wagons upon the Regional Controller of Priorities who allotted a quota and the railway provided the wagons at different stations under the instructions of the Timber Transport Advisory Committee.

Other measures adopted were arrangement of the programmes and special assistance for essential movements, diverting movements to coastal shipping

and other forms of transport where suitable, zoning and rationalising in order to make more rail capacity available, restricting or banning uneconomical and unnecessary movements and keeping a check upon waste of capacity.

In spite of all the above measures, transport proved to be one of the biggest retarding factor in war production. For instance, coal could not be sent to the consuming areas for want of wagons and there were occasions when factories had to close down for want of coal. Shortage of wagons was not the only factor in short supply of coal, but this was in many cases the most important cause of non-supply of coal. The transport situation assumed serious proportions late in 1943, and in 1944, when output of almost every industry was affected. For instance, production of timber in 1944-45 fell below the figures attained in 1943-44 and stood at 1,163,000 tons as compared with 1,274,000 tons for the previous year. The limitations of rail transport necessitated curtailment of timber production. So a Timber Allocation Committee had to be set up during this year to ration out the limited availabilities as restricted mainly by movement to the various indentors in accordance with the importance and priority of their demands. Again in case of woodware, limitations on transport and scarcity of electrical energy hampered increase in production and heavy demands during 1944-45 could not be fully met. The ship-building and ship-repairs operations were also greatly hampered by lack of transport of timber.

CHAPTER XLVII

PROBLEMS IN REGARD TO THE SUPPLY OF ELECTRIC POWER

India's resources of electric power were not much developed as compared with western countries and they could hardly cater for even normal requirements. With the outbreak of war, there was enormous demand for power for essential as well as non-essential requirements. New plants could not be installed due to several factors, the chief being non-availability of plant and shortage of coal. Even if it were possible to import the plants it would have been unwise to instal new plants when the existing plants could not work to their full capacity.

It will be remembered that the Electrical Commissioner's office was set up to ensure that the Ordnance Factories and other industries, engaged in important war work, should secure all the electric power which they required. The first handicap experienced by the Electrical Commissioner was that there was no information available on the resources or operations of the electricity supply industry in the country at the time the office was established. The absence of this information was undoubtedly a very severe handicap in the co-operation of the national effort such as was essential in war-time. A power survey of the entire country was, therefore, conducted. Every undertaking, which could be classified as an electric public utility, was discovered and approached for statistical information. Eventually it was possible to ascertain the available power at any place. This data was embodied in the publication "All-India Statistics of Public Electric Utilities for the five years 1939-43". The information so collected was of the utmost value in planning the location of war industry, assessing the essentiality of the application for import of equipment and the allotment of fuel supplies.

As war progressed, it transpired that the existing resources were far from sufficient and some drastic reduction in consumption was most desirable. In order to conserve the available supplies of electrical materials, particularly cables and wires, restriction orders were served on all electricity supply undertakings prohibiting without the permission of the proper authority, any new supply connection or extension of existing supplies. Electricity Control Boards were set up in each Province to deal with applications for supply connections up to 50 K.W. and the Central Electric Power Control Board was formed in Delhi for dealing with applications for larger amount of power. The latter Board had the Secretary of the Labour Department as Chairman with the Electrical Commissioner and Representatives of War and Industries and Supply Departments as members. The extent of the conservation effected is very difficult to estimate but there is little doubt that this comparatively simple measure obviated the use for non-essential purposes of vast quantities of electric wire which was a most important item in very short supply during the war.

No new connections could be allowed unless essentiality was established and it was accepted that a new supply to a factory manufacturing products required either directly or indirectly for the Department of Supply qualified for essentiality. Requests for new connections or for extra loads were to be made very sparingly and only in cases of absolute necessity after it had been established that an alternative source of power was not available. The mere fact that a factory received orders for Defence Services did not prove that its work was so essential that electric supply must be sanctioned. It might be that alternative avenues of production existed where the electric supply was difficult in individual cases or that the factory could find means of dispensing with electric power. So essentiality certificates were issued by the Department only where they thought it absolutely necessary in the interest of war effort.

Emergency Power Restriction Schemes were also devised. Two kinds of emergencies had to be provided against. First, the load of industry was continuously growing in spite of the restrictions on new connections, and, second, the coal supplies to power stations were frequently a source of acute anxiety. It was obviously imperative that circumstances should not be allowed to arise under which the most essential supplies of power to vital services could be jeopardised. To this end, loads were analysed in great detail and priority lists prepared and agreed with the authorities concerned, so that the crisis could be handled without delay by working to pre-arranged plans. In Bombay, it became necessary to establish a system of "Staggered Mill Holidays" to reduce the load on the power system without affecting textile production. Here, too, the heavy loading of the system made it necessary to have plants ready to deal with power shortages due to transmission line or machine outages. In Calcutta, the system of "Power Holidays" was prepared in great detail to be ready for putting into force, should the stocks of coal fall below certain pre-determined figures. Although these figures were on occasions very closely approached, the necessity for implementing this scheme in Calcutta never actually arose.

Early in 1942 the difficulties of maintaining unrestricted supplies of diesel oil to the smaller undertakings (most of which use this type of fuel) became acute and somewhat drastic rationing became necessary. The problem arose mainly due to the shortage of ocean tankers but was also aggravated by the difficulties of transporting oil inside India due to the heavy pressure on the railway system. It became necessary to restrict the hours of operation of a large number of small undertakings and a good deal of hardship thereby ensued. The task was undertaken under the broad directions of the Electrical Commissioner's Office by five Fuel Oil Advisory Committees dealing with appropriate regions throughout the country.

Rationing of coal (which is the fuel used by many of the larger undertakings) was a much more difficult matter. The Government of India decided that in the larger undertakings, no regular electricity rationing could be contemplated on account of its interference with war production. The Electrical Commissioner's office accordingly handled the fixation of quotas, ensuring supplies, rushing extra coal to individual undertakings whose stocks had fallen too low, and similar work. The difficulties of this task increased greatly when the output of coal deteriorated not only in quantity but also in quality, thus raising the consumption of coal per unit generated. Transport restrictions added to the difficulties but much praise is due to the Coal Commissioner's office which co-operated very fully with the Electrical Commissioner's office in maintaining supplies. Total shut downs of power due to fuel shortage never occurred but there were a good many cases of severe restriction of power supply for a few days while stocks were being replenished.

Almost immediately after the establishment of the Electrical Commissioner's office, plans had to be made for the provision of structural precautions in any electricity supply undertakings likely to be threatened by enemy air attack. Later on a complete plan was worked out for the denial to the enemy of the most vital heavy electric plant in areas which might possibly be overrun. Fortunately it was never necessary to make use of any of the plans prepared.

With a view to preserve as much equipment as possible from the danger of air attack, the most valuable spare parts and other reserve equipment from the larger electrical undertakings in Bengal were transferred to locations in Central India. For example, an entire power station was dismantled, and removed from Calcutta and re-erected at Harduaganj in the U.P. This task was carried out primarily with the objective of augmenting generating capacity to meet anticipated munitions and war industry loads in a strategically safer area than Calcutta. The task was greatly complicated by the difficulties of the

transport situation and was also seriously delayed by the disturbances which occurred in the Autumn of 1942.

Early in 1942, the plant procurement situation overseas deteriorated and reliance could not wholly be placed on *ad hoc* attempts by individual undertakings to secure plant particularly as future demands arising out of the war in India could not be foreseen with any certainty. It was, therefore, decided to set up a Pool of Reserve plant and H.M.G. allocated manufacturing capacity for this purpose. Steam Power Station Equipments were ordered together with all their appropriate auxiliaries from the U.K. and Diesel General Power Station Equipments from the U.S.A. and later distributed where required.

Another problem tackled by the organisation was providing assistance to the undertakings in regard to equipment materials, and facilities to carry out their extensions. This was solved by creating a new Directorate which provided all possible assistance by keeping in touch with overseas supplies.

CHAPTER XLVIII

SPECIAL PROBLEMS IN REGARD TO MAJOR ITEMS

The Supply Department organised a prodigious expansion of Indian production to provide the materials of war and it combed the world markets for goods, particularly for raw materials, when local production was not sufficient. The Department had to provide everything needed to arm and equip our fighting men. This involved re-organisation of the important industries such as clothing, woollen, cotton textiles, jute, munitions, engineering, iron and steel, non-ferrous metals, machine tools, chemicals, etc. It would take volumes to give a complete picture of the problems that confronted the Department in re-organising the economy of the country. Below are given important problems which arose in regard to particular items and measures taken to deal with them.

(a) Hard Stores (Munitions Production, Engineering, Iron and Steel, Metals, Machine Tools, etc.)

Munitions Production.—When the war broke out, there were only six Ordnance Factories. These manufactured guns and ammunition of types becoming obsolete in the U.K. and other Empire countries, and, for some time prior to the war, plans for the modernisation and expansion were under consideration to enable them to produce modern types of weapons and ammunition. There was no civil armament industry in India. This capacity was developed during war to produce components, but even under war conditions, practically no finished armament stores were produced outside ordnance factories. Indian ordnance factories were differently situated from ordnance factories in the U.K., where reliance could be placed on civil industry for many of the primaries essential to armament production. The activities of Indian ordnance factories had in fact, to cover the whole field of armament production including:—

- (a) manufacture of alloy steel and tool steels;
- (b) manufacture of steel for shell and rolling of shell bar;
- (c) manufacture of gun forgings and their heat treatment;
- (d) manufacture of non-ferrous alloys and rolling and extrusion of the same for S.A.A., gun cartridge cases, fuzes, etc.
- (e) Manufacture of high explosives, including primaries, e.g., toluene, nitric acid, etc.
- (f) manufacture of propellants, including primaries, e.g., nitric acid, nitro-glycerine, acetone, etc.

Another factor of importance in connection with armament production in India was that India had little or no civil industry for the manufacture of tools, gauges, jigs and fixtures; consequently ordnance factories had to be largely self-supporting in the manufacture of these important ancillaries to production. So far as General Engineering Trade was concerned, India was nothing less than a jobbing country. We entered the war with most of the engineering workshops carrying on with machinery which was out of date. It was not possible to wait for up-to-date production machines before organising the war effort. The average workshop was still short of skilled supervision—one of the keys of mass production. Thus in September 1939, our main assets for the production of munitions and engineering stores were a young but flourishing steel industry, the Ordnance Factories and Railway workshops and excellent facilities for fabricated steel work. The main weaknesses were a lack of non-ferrous metals, shortage of technicians and, above all, the absence of general engineering workshops equipped and staffed for mass production.

Some preparatory action had also been taken, and projects to introduce modernisation and expand the existing factories formulated even before the war. Elaborate records of requirements of materials and semi-manufactured components during the expansion period, based on M.G.O.'s war programme, had been compiled in all Ordnance Factories. Two Standing War Indents, one for supplies from the U.K. and another for supplies to be obtained in India, had been prepared. Balancing plant and machinery to the value of Rs. 20 lakhs was ordered and deficiencies in reserves of materials to the value of Rs. 18.69 lakhs were ordered, and provision made for working balances to the value of Rs. 14 lakhs. A partial survey of capacities of engineering firms was also carried out. This was the position when the war broke out.

In 1939, it was obvious that the role of India's defence forces in a future war would have to be changed from one of protection of India's frontiers alone to that of defending strategic points outside India. As already mentioned, the Indian Ordnance Factories prior to the outbreak of war were only producing obsolete stores and with the change in the technique of warfare, some modernisation appeared necessary. After the fall of France, the Commonwealth countries found themselves standing alone to face a well-armed enemy. India could no longer depend on Britain, who herself, with her factories, subject to continuous bombing, was forced to look on other units for vital needs of life. Shipping difficulties and the Japanese menace to the borders of India, were some of the other factors which necessitated a rigorous drive for the planning and expansion of the ammunition industry.

The first plan to be implemented was the Chatfield Plan, which provided for the expansion and modernisation of all existing Ordnance Factories and the installation of new types of machine tools. Soon after the outbreak of war further additions known as Post-Chatfield Measures were made to the original scheme, the most important being a project for the expansion of S.A. ammunition by 12 million rounds per month. In 1940, the Roger Mission visited the country to examine the possibility of further expansion and plans of 21 new projects known as E.G. Plans including projects of alloy steels for guns and small arms, gun forgings, bayonets, light machine-guns, gun carriages, etc., were accepted.

Before the Chatfield and E.G. Plans could be fully implemented, Japan came into the war and it was decided that no new Ordnance Factory capacity should be installed in Bengal owing to the constant threat of aerial bombardment and further, that any of the Projects, already planned in Bengal and which had not been installed, should be transplanted elsewhere. This policy gave rise to the T.P. Plan which involved the building of five new Ordnance Factories and the expansion of two of the factories under E.G. Plan. After the T.P. Plan a new series of Projects was started, the important being maintenance of imported types of artillery equipment, maintenance of aircraft instruments, production of light-type respirators, etc.

From the time of the Chatfield Plan, arrangements were made to use civil capacity for the production of armament components. As a result of this policy, three complete railway workshops were allocated to armament production, while the manufacture of components for mines, mortar bombs, grenades, etc., was developed in a wide range of civil and railway workshops throughout India.

By these expansion measures, India's war-time output of ammunition was doubled, trebled and quadrupled and increased under, certain items, 20 to 50 times. The value of munitions production during war years amounted to about Rs. 131.06 crores. Difficult problems had to be tackled to attain this high production. An organisation—the Ordnance Factories having specialised Directorates for Factory Expansion, Factory Recruitment, etc., along with a Civil Armaments Production Division, had to be set up in D.G.M.P. The main problems faced by the Department, can be grouped under (a) Production, (b) Provision of Stores and Materials, (c) Labour difficulties.

(a) **Production.**—An Industrial Planning Organisation was set up in 1940. Early in the war, many changes occurred in the requirements previously given in the Pink Plan on which the production programmes of factories had been planned and production adjusted accordingly. Indigenous supplies and substitutes were developed in lieu of imported materials e.g., several rifle and machine-gun parts previously plastic mouldings from import were made from timber Parrotia; steel was made in the Acid Open Hearth from 100 per cent. scrap with petroleum coke thus avoiding the use of haematite pig; tipping of tools was introduced on an increased scale to conserve High Speed Steel; and indigenous substitutes were used for Rifle Furniture previously made of walnut from Kashmir or by import. Owing to the shortage of extruded tar, an increased use of hot rolled brass was made. Exhibitions of samples were arranged at Calcutta, Lahore, Bombay, Madras, Cawnpore, to seek further assistance from Trade. Lack of suitable heat treatment facilities with Trade handicapped undertaking the manufacture of many items. Difficulties were also experienced with supplies of poor quality coal. Wear and tear on plant due to continuous running was met by systematic overhaul and repair by expanded repair sections, set up for the purpose. During 1942-43, it became necessary to set up machinery to assist in obtaining and distributing essential foodstuffs for the workmen to steady the labour force, which appreciably reduced defections. There were difficulties in the production of S.A.A. and services of experts from the Royal Ordnance Factories were obtained. For the production drive, thousands of tons of steel work for the new industrial buildings were fabricated and machine tools and plant together with ancillary equipment was obtained to equip the factories. Major schemes of water supply, electric supply, sewage disposal, etc., were carried out and new roads and railway communications were laid down to operate the newly constructed factories. Arrangements were also made for housing the factory personnel.

(b) **Provision of Stores and Materials.**

(i) **Flow of supplies from overseas.**—Until the end of 1941, Provision had, generally, worked smoothly, supplies were fairly regular and losses from submarine warfare were not unduly heavy, nor did they materially affect production in Ordnance Factories. The passing of the Lease-Lend Act in U.S.A. had considerably assisted in augmenting supplies, and those classed as critical were later insured by the formation of allied pools from which these critical resources of the allied nations were controlled and distributed.

From early in 1942, losses from increased submarine attacks on shipping had become severe. By then the use of the Mediterranean sea route to India had also been lost which necessitated shipping being diverted by South Africa. This much longer route considerably lengthened the period of transit for goods from U.K. The possibility of such a contingency had been foreseen and to meet the situation, increased supplies from that source were demanded late in 1941, in order to build up War Working Balances of overseas goods to six months' utilisation at full rate of outturn. By now, too, provision for requirements of new Ordnance Factories was being made and demands on both overseas and this country were stepped up.

Scarcity of supplies and difficulties in procurement increased greatly in 1943. With the expansion of war theatres, this was inevitable and so far as India is concerned, a further strain was thrown on its resources in some instances by requirements for the large forces from the U.S.A. which had by then arrived in India.

By 1944 submarine warfare had been considerably reduced. Allied successes in all theatres of war were occurring and the flow of goods from overseas was increasing. With few exceptions in the case of critical goods, factories were now receiving almost full requirements. From March 1944, the allowance for War Working Balances of overseas supplies was reduced to 4 months' utilisation.

(ii) **Mutual Aid Scheme.**—To expand the normal transfers of stores and materials between factories in order to assist those in very urgent need, a detailed "Mutual Aid Scheme" was worked out and set in operation in 1942. This scheme was of great benefit and considerable quantities of stores were made available to factories in more urgent need than others.

(iii) **Salvage.**—From practically the outbreak of war, the Ordnance Factories had been making recoveries of unserviceable small tools before these were discarded after use by such methods as refurbishing files and retipping tools with serviceable parts cut from otherwise worn out tools, etc. This process of salvage was intensified in 1943, when a regular salvage section was formed in each factory. Large savings of valuable stores, often in short supply, and of considerable value, were thus effected.

(iv) **Relaxations to Specifications for Materials.**—Relaxations in Specifications, which had been granted somewhat sparingly at the outbreak of war, were extended as the war continued and considerable success was achieved in the search for, and in the use of, substitutes. This policy gave considerable relief to procurement problems.

(v) **Storage Accommodation.**—The storage accommodation in the old factories proved completely inadequate for war conditions and the necessity for large expansions was not realised sufficiently early in the war. Stores organisation was, as a consequence, severely handicapped. Similarly in the new factories, initial storage provision was on far too limited a scale. The situation was considerably aggravated in the latter by the time lag taken by these new installations to get into production, during which stocks of materials of all natures, particularly ammunition boxes from trade sources, accumulated to an alarming extent.

(c) **Labour difficulties.**—The provision of skilled and semi-skilled labour and the supervisory staff for the Ordnance Factories on the expanded scale presented a problem of some magnitude. Pre-war training schemes were inadequate. In the earliest period of the war, though there was great demand in factories for men of all grades and trades and degrees of skill, it was possible to meet the requirements satisfactorily, with the exception of tool and gauge makers by intensive recruitment from outside sources and in the U.K. for the more highly specialised posts on the gazetted and non-gazetted supervisory staff. Some 19,000 workmen were recruited in this manner during the first seven months of the war.

Early in 1941, it became obvious that the resources of junior supervision, skilled and semi-skilled labour in the country had been tapped to the full. The existing Factories had undergone and were still undergoing major expansions and a number of new installations were being created. All these demanded man-power to an increasing extent. The Technical Training Schemes of the Labour Department and the Bevin Training Schemes were unable to meet the Ordnance Factories requirements. The problem was solved by training of personnel in the Factories themselves. The existing schemes were expanded and new plans formulated. The peace-time Apprentice Training and Boy Artisan Training Schemes were considerably modified—perhaps abandoned—would be a more appropriate term—and a scheme aimed at meeting the new situation was drawn up. The scheme consisted of two distinct sections, one the Supervisor Training Scheme spread over a period from 9 to 12 months and the other the Artisan Trainees Scheme covering a period up to 9 months. A number of instructors were obtained from the U.K. and many others were selected from the staff of the Ordnance Factories and trained in the method of instruction it had been decided to adopt. Complete teams of men required for manning production units of the new Factories were trained in these centres and in the workshops of the old factories. Large housing estates were constructed for housing the labour and special arrangements for distribution of food items were made. These training schemes, in addition to supplying more

than 40,000 semi-skilled grade II workmen, met in full the demands for a total of 1,954 supervisors, draughtsmen and estimators; more than 3,200 skilled (including highly skilled) and 7,100 semi-skilled grade I workmen. An idea of the problem can be had from the fact that while the strength of staff and workmen in Ordnance Factories just prior to outbreak of war was 17,500, it rose to over 116,000 at the end of February 1945.

Machine Tools.—Machines and machine tools are the most dreaded bottlenecks in any war-time production. Before tanks, aircraft and guns can roll into services, factories must be provided with machine tools. These tools are to the engineering industry, what saw, chisel, hammer, rasp and plane are to a carpenter.

No regular machine tool industry existed in India before the war, though various machine tools were made in the larger engineering workshops. The importance of this industry was realised early and a compulsory census was undertaken by the Supply Department in July 1940. As a result of the Roger Mission and the Eastern Group Conference, the policy regarding India's industrial products had to be re-oriented and great emphasis was laid on production of ammunitions. A Machine Tool Control Order was, therefore, issued and a Machine Tool Controller appointed in 1941. With the collapse of France and entry of Italy into the war, India was virtually cut off from all imports from the U. K. and the U. S. A. and had to rely on her own resources and small imports of low-grade machine tools from China and Japan. The Department had to arrange as much as 60 per cent. of India's requirements from indigenous production within the shortest possible period. The problem was solved by encouraging manufacturers who showed interest in the work and by the introduction of a scheme of rationalisation of orders and of manufacture. This involved expansion of five of the more experienced machine tools manufacturing firms. A team of technicians, to assist the industry, was sent by the U. K. Machine Tool Controller. Rationalisation and laying down of standards were two important tasks. Government took over ordering of all the machine tools required for the country and their distribution. Licensing was limited to those who had a fair chance of success. The system of Bulk manufacture and Bulk ordering was introduced. As its continuance for an indefinite period was inadvisable, Government reverted to the usual trade channels in 1944, but rationalisation measures were enforced through a licensing system. Statutory maximum prices were fixed. Machine tools were graded. With the adoption of India as the first base for operations by the S.E.A.C., it became essential that India should have an adequate supply of machines for the repair and maintenance of aircraft and aircraft ordnance, etc. An Advisory Mission of experts headed by Sir William Stenier arrived in India. The Mission emphasised the necessity of creating a class of middle class craftsmen and suggested the desirability of collaboration between the industry and the Supply Department. The Mission also suggested a census of machine tools and creation of a reserve of machine tools from which sudden demands could be met. In spite of all these difficulties, the machine tool industry responded magnificently, and while the production in 1939 was only 100 machine tools per annum, the peak production in 1945 reached about 350 machine tools per month.

Iron & Steel.—Introduction of Control.—The total production of steel when the war broke out was 750,000 tons per annum. In pre-war days India imported large quantities—about 300,000 tons per annum—as the indigenous production was not sufficient. With the outbreak of war imports considerably declined. The fall of France and entry of Italy into the war worsened the import position. The Secretary of State fixed a quota of steel for India. In order to ensure that the allocation was not exceeded, it was decided that in future no steel could be obtained from the U. K. without a recommendation issued under the authority of the War Supply Board. The position, however, continued to deteriorate while the capacity of indigenous producers became more and more over-loaded

and towards the end of 1940, Government found it necessary to establish control of imports and the D. G. M. P. was appointed as Import Steel Controller in India.

By then the books of the main producers were completely over-loaded with first priority orders and it appeared that unless a system of rationing was introduced, the railways and essential civil users—graded as second priority—would get no steel. A statutory control of distribution was, therefore, introduced on 1st August 1941, under the Iron & Steel (Control of Distribution) Order, 1941. Steel was allocated to essential users by the M. G. O. to whom the powers of Priority Authority in steel were delegated. Certain departments were appointed "Scheduled Departments or Quota Holders" to ration steel to users who came within their purview.

Initial difficulties.—The new system was rather hurriedly introduced on 1st August 1941 and the officers who were to issue licences on behalf of the Scheduled Departments were, for the most part not in a position and others had generally not been in position sufficiently long to be fully acquainted with the demands coming within their purview. To give the licensing officers time to review the existing orders and demands, the producers were allowed to continue despatches against first priority orders during August. The position, however, did not improve and the period had to be extended. The situation somewhat improved during the second half of 1941 but quota holders had, for the most part licensed entirely new demands while they had received deliveries against their first priority orders which remained unlicensed. Producers were then instructed to cancel all unlicensed orders outstanding on 31st December 1941, but owing to the action of quota holders had, for the most part licensed entirely new demands while they had received deliveries against their December 1941, but owing to the action of quota holders the mills faced a heavy carry forward of orders licensed for delivery in periods III and IV, 1941 which necessitated a cut in the allotments for periods I and II, 1942 to retrieve the position. The disturbances in August 1942, however, resulted in a heavy set back as there was a strike at the Tata Iron & Steel Co. To meet the situation created by the strike, special measures were adopted to freeze all stocks, to prohibit the movement of steel by rail, road and river except against permits and to restrict deliveries to projects accorded special priority by the Priority Authority. By these measures the effect of the strike on the war effort was minimised, but the objective to deliver steel to the licensee in the licensed period received a severe setback. It became necessary to cut quota allotments again to take care of the carry-forward arising from the strike.

Price Control.—Many difficulties arose from the absence of statutory price control. Under the system of distribution the Controller was empowered to plan licensed indents on producers, but the producer was then free to charge any price except where rate contracts were in operation covering war demands. In these circumstances, customers naturally resisted the planning of their orders on producers who did not issue price lists or who were likely to charge anything more than the minimum price. Re-roller's prices were higher than the main producers' prices and customers made every effort to have their orders planned on main producers. One subterfuge adopted by the customers was to specify tested material which could only be manufactured by the main producers while for the particular contract the customer would normally had specified untested. To overcome this difficulty negotiations were entered into with re-rollers, fixing their conversion rates. The re-rollers were divided into four classes and different conversion rates negotiated for each of the four. This move, however, did not settle the difficulty that indentors would be required to pay different prices for similar material obtained from different sources. To minimise this defect, the Iron & Steel Controller arranged that all re-rollers and all controlled stockholders should sell bars and rods at one declared selling price. In some cases the sale

proceeds were more than the re-rollers were entitled to under the negotiated rates and in other cases the proceeds were less than the re-roller was entitled to. This necessitated the setting up of an Equalization Fund into which the re-rollers paid the excess recoveries and from which other re-rollers drew deficits. The excesses paid by the re-rollers were not sufficient to finance this fund and a surcharge was, therefore, levied on all steel sent to controlled stock and this was put into the fund. At this stage, the number of prices which a licensee might be called upon to pay to a producer for his material for commercial purposes had been reduced to two. When on 1st July 1944, the statutory price control was introduced, all main producers production was brought within the scope of the Equalisation Fund arrangements and a licensee was able to obtain his steel at the same price from any producer irrespective of the purpose for which the steel was required:

Stockholders.—When Control was being introduced Government assured the trade that in respect of steel released for civilian consumption the normal channels of distribution would be maintained. The Iron & Steel Controller was at once faced with the difficulty of the quantity of steel available for distribution being so small that if every registered stockholder was given a share he would not have enough business to maintain his establishment and the stocks would be so dispersed as to be unavailable to meet important demands which the Controller considered should be met from stock. It was, therefore, decided to form Registered Stockholders' Associations in each of the circles of the Deputy Iron & Steel Controllers. These Associations each financed and operated a central controlled stockyard from which the distribution was regulated by the Regional D. I. & S. C. concerned. The small quantities allotted for unlicensed sale to the general public were from time to time distributed from these controlled stockyards to the individual dealers. The C. B. R. agreed that as long as the earnings of the stockyards were distributed to the members, who in their individual capacity would be assessed for E. P. T. and I. T. on account of these earnings, the Associations would be exempt from assessment. This was a very important concession without which these co-operative schemes would have proved impossible.

Other difficulties.—Fundamentally most of the difficulties that faced the Control arose from the fact that whereas the war started on 3rd September, 1939, the Control of Distribution was not introduced till 1st August, 1941, and full control (including price control) came into force only on 1st August 1944. From the beginning of the war up till 1st August 1941, steel continued to be utilised for non-essential purposes. At the same time procurement departments swept up large quantities of steel for war purposes. Stocks throughout the country were absorbed both for war purposes and non-essential civil purposes. Had the Control been introduced at the beginning of the war, even in the emasculated form embodied in the original Iron & Steel (Control of Distribution) Order, 1941, procurement authorities would have become accustomed to look to the Control for steel supplies, and steel would not have been utilised for two years for non-essential purposes and the buffer stock in the country would have enabled the Controller to give assistance in the procurement of urgent supplies. This, of course, was impossible in 1941, when the stocks were almost negligible.

The experience gained throughout the four years of war-time control has shown that the scheme of distribution under the quota system was founded on sound principles. The main weaknesses of the quota system were that the Scheduled Departments were generally not in a position to assess the importance of the various demands for steel which were placed before them. They had no opportunity to accumulate the necessary knowledge and build up an adequate staff to make appropriate enquiries before the full weight of responsibility was thrust upon them in what was actually a time of crisis. Many of the difficulties which arose during the operation of the Control could have been avoided if the amended Iron & Steel (Control of Production & Distribution) Order, 1941, as it stood on 1st July 1944, could have been introduced on 1st August 1941. Many

more could have been avoided and the Control would have received greater co-operation from the War Procurement Departments of Government if this Control had been introduced at the beginning of the war.

Non-ferrous metals.—India was highly deficient in regard to the essential non-ferrous metals—aluminium, copper, lead, zinc and tin. The situation which was serious when the war broke out, was further aggravated by the shrinkage of shipping space and dwindling imports. Economy in the use of every non-ferrous metal was, therefore, most essential and it was decided to issue a Non-ferrous Metals Control Order. The use of metals was prohibited except when no substitutes were available. The situation was, however, to some extent brought under control with the help of the C. R. M. B. There were special difficulties in carrying out the control in India as the business did not pass through well-defined channels and there was a complete absence of a statistical background. No highly organised scrap utilisation trade, no scientific sorting, no laboratory control and no standard specifications existed. Most scrap found its way to bazar. Efforts were made by the Supply Department to collect scrap and use it in the most economic way. Demands for processed metals were heavy, and the problem was solved by developing production of wire, strip and rod. The greatest handicap was the lack of technical personnel.

With the outbreak of war, imports of aluminium sheets and circles diminished and finally ceased in 1940. Secondary aluminium scrap became the only source of supply. Loss of Malaya worsened the situation as tin too was lost. Government was compelled to introduce strict control over all available scrap. Aluminium was released only for auxiliary parts of electrical transformers, scientific instruments, service utensils, medicinal containers and air raid sirens. Active steps were taken to develop the industry.

Armoured Vehicles.—On the outbreak of war, India was found without any facilities for the manufacture of armoured vehicles, which are an essential part in mechanised warfare. Measures were soon taken to develop this industry. The chassis for the vehicles had to be imported from abroad but the body could be designed and manufactured locally. This necessitated the development of the manufacture of bullet-proof steel according to War Office specifications. The Tata Works at Jamshedpur succeeded in making bullet-proof plating which came up to the specifications required. As the quantities produced were not adequate, imports had to be arranged from America. The next problem was the fabrication of the bullet-proof steel. This entailed the import of the oxy-acetylene cutting plant which is the most economic and expeditious method of fabricating the bullet-proof steel into the required forms and sizes of plates.

Shipbuilding and Ship Repair.

(a) **Ship-repairs.**—The Commercial Ship Repair Industry in India in peace catered for inter-voyage repairs of ocean-going tonnage and ships plying in Indian waters and consisted of 15 Repair Firms at various ports. In addition the Port Trust at some ports possessed workshops for the maintenance of their own craft. The entirely new orientation given to Allied strategy by the surrender of France in the summer of 1940 and in particular the loss of French Mediterranean ports, the immensely greater strain placed on the British Navy and Mercantile Marine and later the loss of great dockyards at Hongkong and Singapore gave the ports of India a new and urgent significance. In the beginning their resources were not unduly strained but during the later part of 1941, the Dockyard and the Commercial Firms at short notice were called upon to cope with a great increase in work due to ships operating in the North African area being diverted to India for repairs and by the beginning of 1942, with ships from the Pacific where repair facilities had been captured by the enemy. Moreover, India had also to shoulder part of the repair work that the U. K. Yard could no longer undertake.

For the navy and the merchant service, India is as much a junction as an outpost. When she first assumed this dual role, she was but poorly qualified to fulfil it from the marine engineer's point of view. The chief disabilities which confronted the Supply Department in a new and unexpected situation were a serious deficiency of machinery and essential stores and an acute shortage of dry docking facilities. They were gradually over-come and additional berthage and dry docks were prepared at certain West Coast ports, priorities for machinery and stores were carried into effect and the Scindia shipbuilding yard was transferred from an East Coast to a West Coast port, a distance of several hundred miles.

(b) **Shipbuilding.**—In peace, shipbuilding had been limited to building small launches, yachts, etc., but to meet war needs the building of trawlers was commenced in 1940 in Calcutta utilising engineering capacity and Indian steel. As the shipbuilding firms in the U. K., Australia, Canada and South Africa were over-loaded with orders, it was found impossible to bring out from the U. K. vessels required for the defence of India. An urgent need also arose for mine sweepers and escort craft. A survey of the facilities available in India for shipbuilding was made. The Admiralty undertook to supply all propellant machinery, electrical machinery, first fitting stores, permanent stores and naval stores. Delay in receipt of machinery and equipment from overseas was a serious bottleneck. There were no workshops with spare capacity and different parts had to be arranged in different workshops. The paucity of steel supplies, reluctance of exporting countries to supply heavy machinery, mammoth presses and machines for drawing solid boiler tubes and corrugated furnaces, etc., were the other limiting factors.

Problems common to shipbuilding and Shiprepairs.

(a) **Expansion schemes.**—One of the earliest problems which faced the D. G. S. R. was the expansion and development of the shipbuilding and repair capacity of India to meet the vastly increased load. The schemes for development involved the provision of buildings, machine tools and equipment. Provision had also to be made for the expansion of West Coast facilities when the East Coast was under enemy threat. In all 30 expansion schemes were carried out and these were put forward in agreement with the firms and while, in some cases, the firms agreed to pay for the whole cost and Government had only to provide official support, in others the firms met a portion of the expansion only and assistance to the extent of about Rs. 150 lakhs had to be provided by Government.

(b) **Bombay Docks Explosion.**—On April 14th, 1944, the explosion in an ammunition ship at No. 1 Berth Victoria Dock wrecked the Princes and Victoria Docks Railway tracks, electric substations, hydraulic, electric, and fresh water main, sewers and storm water drains were severely damaged. The disaster had a very serious effect on the ship repair capacity of Bombay, particularly in the reduction of berthing capacity, cranes, etc. Much plant which had been obtained from the U. K. such as welding sets and shipyard machinery, etc., was destroyed. In order to facilitate repairs to ships, it was decided to pump the water out of Victoria Dock and the D. G. S. R. assisted in installing pumping machinery in various craft.

(c) **Materials.**—In the early days of the war, ship repair firms had been buying both indigenous and imported materials wherever they could in the market. By 1942, however, stocks of imported stores were extremely difficult to come by and indigenous production to meet the war-time load had not yet got into its stride. Information about deficiencies was collected and a bulk demand was placed on H.M.G. There was considerable delay (about 15 months) in the arrival of the materials but they did arrive just about in time to prevent what might have been very grave shortages. It was later arranged that this bulk indent should be followed up twice yearly by further orders on H.M.G. Steel and timber proved to be the greatest headaches while other items, viz., non-ferrous, electrical, etc., did not give so much trouble as they were held in stock by the D. G. M. P.

(i) **Steel.**—The ship-repair and shipbuilding industry in India had been given a quota of India steel production which, before the creation of D. G. S. R. was administered by the R.I.N. There was considerable ignorance at ports (particularly outside Calcutta) as to how to work the control machinery in order to obtain steel. During 1942 Indian production as against demand was so far in arrears that an interval of 6 to 9 months elapsed between the application for licences and obtaining the steel; difficulties of transport between production site and consuming port also occurred. Later firms were instructed how to work the steel licencing system and with the taking over the administration of the R.I.N. quota by the D. G. S. R. special officers were appointed at Bombay and Calcutta to handle these quotas and establish liaison with the Iron and Steel Control, to chase up indents, to see to any special urgent requirements and so on. The main quota was sub-divided into different allotments for merchant ship repairs, naval repairs, D.E.M.S., S.I.D.G. and Plastic Armour.

2,600 tons of steel imported by Scindias was requisitioned and distributed to firms to tide over the period until Indian steel became available. The Naval Store Officer attached to H.M.I. Dockyard had special steel imported into India by the Admiralty which was a very useful source in times of difficulty. The question of the quality of Indian rolled plates and sections required for merchant ship repairs at one time caused a certain amount of discussion. Open-hearth basic steel was required and matter was fixed up with the Iron and Steel Controller. Certain rollings were either not carried out in India at all or the production was inadequate. Hence bulk angles had to be imported throughout the war and also specially long and wide plates required for after-action damage repairs to the widestraked Liberty and Victory Ships. As delays occurred in getting steel from the stock holders it was decided to lay down stocks of D.G.S.R. at ports.

(ii) **Timber.**—In 1942, the timber stock in "ponds" under the control of the Timber Directorate was almost completely ear-marked for other purposes and it was necessary for the large-building programme to deal direct with the different Forestry Conservators and District Officers from Kathiawar in the north to Cochin in the South. Later, a quota was given and repair firms were allowed to maintain modest stocks. Some 22,000 tons of Oregon Pine were imported under L/L. There was a great shortage of Burma teak required for shipbuilding and designs and specifications had to be modified to permit of the use of Oregon Pine. Lignum Vitae was imported against bulk demands on H.M.G.

Storage of steel was first arranged departmentally and then handed over to the Iron and Steel Control. Timber was kept in Supply Department's timber ponds. For miscellaneous stores, however, contracts with private firms in Bombay and Karachi were arranged and in Calcutta storage was done departmentally.

(d) **Machine Tools.**—It was realised at the outset that the supply of machinery and plant was going to prove one of the greatest bottlenecks to be overcome. A Committee composed of prominent representatives of the larger ship repair firms with D.G.S.R. as Chairman worked out by discussion a list of essential shipyard machinery and plant. This list of special heavy machines totalled 322 including Welding Plant and Air Compressors with their auxiliary tools and equipment. The whole demand was submitted in May 1942 to Admiralty, M.W.T. and Delhi. After protracted correspondence, a modified demand for key plant and materials was accepted for supply in September 1942 which was eventually met from the U. S. A. on L/L and cost approximately Rs. 87.8 lakhs. The Admiralty assisted with some special machines and supplied all the Arc Welding Plant. This was regarded as a short term policy covering essentials only, immediate assistance in the way of plant being expected by the decision to close the East Coast to shipping and to transport considerable ship repair plant to the West. In actual fact only a small amount of relatively old plant was moved to Bombay. This nullified expectations and made the position more difficult.

Further demands for plant were routed through the Machine Tool Control and about 900 Machines (value about 85.75 lakhs) were supplied through him to the various shipbuilding and port authorities in India.

(e) **Labour.**—In the early days of War owing to the small size of the industry labour force was strictly limited and the amount of skilled labour small and, in many cases, its standard was low. European supervision was lacking. Labour was very sensitive to bazar war rumours and these periodically drove labour away, especially from the East Coast Ports. The National Service (Technical Personnel) Ordinance, 1940, proved of inestimable value in dealing with technical labour. The essential difficulty was the important factor that all labour are Ryots or Peasants and every year they simply fade away to their Paddy fields.

The shortage of highly skilled labour, was made good by posting 900 Italian Prisoners-of-War to various shipbuilding, Naval and Repair Yards. The Chinese labour both from the Singapore and Hong Kong was also obtained. Under National Service (European British Subjects) Act, 1940, all British European Subjects became conscripted on arrival in India. National Service Advisory Committees were constituted in all large towns in India and the D.G.S.R. working in conjunction with these Committees was able to place a considerable number of Europeans and others with marine experience in the various Shipbuilding and Repair Yards.

As Labour Department Technical Training Scheme did not produce sufficiently skilled operatives, Yards began to train their own men, and eventually more men were recruited from U. K. The number of worker in Shipbuilding and Repair Yards in India expanded from between 8,000 and 9,000 in 1939 to 56,000 in 1945, just prior to the cessation of hostilities with Japan inclusive of H.M.I. Dockyard Bombay.

(f) **D. E. M. S. Organisation in India.**—The need for established D. E. M. S. organisation was foreseen by Admiralty about 1941, but it was in 1942 that a D. E. M. S. Staff Officer was appointed in Bombay. Due to acute shortage of weapons and other suitable equipment and to the necessity for employing the large majority of trained D. E. M. S. personnel in the War against Germany, the organisation in India was very tardily developed. Between 1942 and the summer of 1943, D. E. M. S. Bases were established at Bombay, Calcutta, Karachi and Madras. In 1943 weapons for equipping Merchant Ships became more plentiful and moderate progress was achieved in fitting out Merchant Ships in India. The shortage of D. E. M. S. personnel to man these guns was still very great and a shuttle service organisation was commenced whereby D. E. M. S. Gunners were embarked in ships proceeding into the more vulnerable areas, disembarked on leaving those areas and re-embarked in other ships returning through them. In 1944 D. E. M. S. Bases at Vizagapatam, Cochin and Chittagong were opened up and Ships were armed at an ever increasing rate. Labour troubles and the lack of adequate supervision were the main difficulties encountered at all ports. The Organisation generally suffered from inadequacy of staff, but on no occasion in the later stages of the War did a Merchant Ship proceed into an operational area without it being fully armed and manned.

Guns and mountings fitting in India	...	...	...	1,578.
Ships defensively armed in India	...	...	...	510.
Ships fitted with Paravanes	...	...	...	391.

In addition gun positions, ammunitions lockers, deck stiffening and wiring for telephones, bells, etc., were fitted in many ships.

(f) **Plastic Armour.**—In the absence of adequate supplies of steel plating, plastic armour was used in Merchant vessels. Climate has considerable effect on plastic armour. The history of its production has shown that methods used with success in temperate climates required modification in the tropics. This was a major factor in the failure under test of experimental slabs manufactured at

various centres in India prior to the arrival of a Plastic Armour Specialist. With his arrival successful tests were carried out on a slab taken from a "mix" that was to be adopted as Standard Plastic Armour. Later tests proved its bullet-resisting qualities and resistance to extensive ranges of temperature.

Among the minor problems that faced the P. A. Staff responsible for its production was the necessity not only of supervising its manufacture but the seeking out of suitable materials which had to be transported over long distances. The paucity of suitable aggregate led to enquiries being made and the assistance of Department of Geological Survey in India was requested. Finally, a quartzite gravel was discovered at Surat which solved this particular problem until a second factory had to be set up on the East Coast. A similar search was made for bitumen, a most elusive material in those days. Delhi was approached for the release of 1,500 tons of Caltex No. 10 Bitumen obtained under Lease, Lend and the problem was solved. An interesting innovation exclusive to Plastic Armour manufactured in India was the special cane type of re-inforcement in use since August 1942. Experiments to produce slabs to withstand the climatic conditions that war-time shipping was being subjected to from the tropical heat to the arctic condition were carried out. A Bitumastic-grey paint to combat all weather was manufactured to conform to ship's camouflage, a deck-head water proofing was invented, and apart from the standard Plastic Armour slabs of $2\frac{1}{4}$ " thickness, further experiments to prepare "Light-weight" slabs using sawdust and castor-oil and Plastic Protective Plating were successfully carried out. All these slabs have been extensively used by the Navy and Army for Radar Tower and Bull dozer protection. Thus the history of Plastic Armour in India has not been without difficulties but these were overcome and production and application became a matter of routine. Upto August 1945 about 6,000 tons of Plastic Armour were manufactured.

(g) **Degaussing Installation work in India.**—The sudden appearance of the magnetic mine in the U. K. waters was dealt with in a characteristically silent and expeditious manner by the British Admiralty by fitting electrically energised coils to ships in order to neutralise the magnetic effects which caused a ship to detonate the mine. To relieve the congestion in British ports this work was commenced at Bombay at the beginning of 1940. No trained experts were available in India or elsewhere and the R.I.N. was called upon to carry out this work with their personnel and the then existing facilities. Admiralty instructions and technical information were available but requisite materials were often lacking while the methods and instructions were continually changing in order to keep pace with research, and developments in the magnetic mine. The supply of suitable cables was a major difficulty as indigenous cables were not of the required type. The cables used weighed as much as five tons per drum and it was not unusual to instal 8,500 yards or nearly 5 miles of such cable in a single ship. The importation of such bulky supplies from England was always a problem but the situation gradually improved. In many cases various combinations of different sized cables had to be used to achieve the desired result. Ships could not be delayed and there was generally a race against time during the short stay of the vessel in port.

By the beginning of 1942, a degaussing organisation under a Superintending Inspector of Degaussing stationed at Bombay had been established at all the principal ports in India. By means of a card index system, records were maintained for all ships which were fitted with D. G. equipment or tested on a D. G. range in any part of the world. After 1942 practically all ships had been fitted with D. G. During 1940-45 the number of ships D. G. installed came to 332, repaired to 534 and those tested and adjusted to 694.

(h) **Net Cost Emergency Repairs Agreement.**—In war the delay involved, after the arrival of a ship, in calling for estimates to tenders for undertaking repairs was unacceptable and the alternative of carrying out the work under a

Net Cost Emergency Repairs Agreement was introduced for all type of work in naval ships, for conversion and for D.E.M.S. work. The Admiralty agreement was adopted for the work on H.M.G. Account and an Indian agreement for work on Government of India Account. It was a "cost-plus" contract and was not free from defects inherent in such contracts. A work order system was adopted and a cadre of Cost Inspection Officers was formed with the dual object of checking the labour and materials used in jobs and of carrying out a more efficient scrutiny of bills while progressing them from the time they left contractors until they were passed to the Accounts Branch for payment.

It may be mentioned that D.G.S.R. had the powers under the Factories (Control of Production) Order, 1942, to control the capacity of any ship-repair and shipbuilding firms and could prevent the firm taking any other work. This Order was an essential corollary to the N.C.E.R.A.

AIRCRAFT

Prior to the World War II it was the policy of the Air Forces in India to maintain their units in the following manner:—

- (i) The few Operational Squadrons and one Flying Training School were located on permanent aerodromes mainly on the North-West Frontier. These Units did their own repair and maintenance work up to but excluding complete overhaul and major policy.
- (ii) A small Aircraft Repairs Depot at Karachi undertook all overhauls and major repairs arising from these Flying Units.
- (iii) All technical spares and equipment were imported.

The entry of Japan into the War and early collapse of Malaya and Burma turned the Eastern Provinces of India into a war theatre and caused an immediate expansion of the Air Forces all over India. Squadrons were forced to operate from temporary Aerodromes with no maintenance facilities: The Repair Depot at Karachi was too small to accept the large repair load which immediately arose and too far away from the scene of operations. Last but not the least, the importation of spares and equipment was affected by the priority given to the other theatres of War and by enemy action on the long line of communications.

As a consequence, it was essential to set up a large repair and maintenance organisation in India and to manufacture as many spares and as much equipment as possible locally in order to keep the Air Forces operating. The Air Forces themselves had insufficient personnel to set up such an organisation and therefore they turned to the Government of India and asked for assistance from civilian resources in so far as the facilities of the country would admit it and requested that an organisation be created on the lines of the Civilian Repair Organisation set up in England. The Government of India entrusted this task to the Supply Department and in January 1942, a beginning was made by forming a small Section under the D.G.M.P. This section eventually expanded into an Aeronautical Division and finally into the separate Directorate General, Aircraft.

The Main problems fell under two main heads:—

- (i) **Manufacture.**—The organisation was required to produce at extremely short notice spares for aircraft, aero-engines etc., etc., lack of which was keeping aircraft unserviceable and interfering with maintenance or preventing the repair organisation from achieving the necessary output of repaired items; to manufacture modification parts arising out of local conditions, and to make workshop

plant and equipment and Squadron maintenance equipment particularly bulky items which were unobtainable in the U.K. and America or which absorbed considerable shipping space, if imported.

- (ii) **Repair.**—The repair organisation was expected to repair and overhaul aircraft, aero-engines, signals apparatus armament gear including Cannons & Machine Guns, Instruments, Electrical Apparatus, Parachutes, Balloons, Wireless and Radar Equipment, special Marinecraft, Ground equipment and all M.T. Vehicles together with components accessories and major spare parts of such articles.

A preliminary survey was made which revealed the following:—

- (a) India lacked an aircraft industry and had none of the Industries allied to aircraft manufacture;
- (b) Civil Aviation was limited to two major air lines with extremely small repair section operating a few passenger aircraft;
- (c) A so-called Aircraft factory existed at Bangalore, staffed with American Civilian Supervisory personnel and Indian semi-skilled labour. It contained some plant and machine tools suitable for aircraft manufacturing work;
- (d) The Tata Aircraft Ltd., were constructing a factory at Poona to manufacture Wooden Gliders, and had recruited a small staff of engineers from the UK, the majority of whom had little or no experience on modern metal aircraft;
- (e) A small repair establishment was available at Cawnpore;
- (f) India was very short of engineers with aeronautical experience;
- (g) None of the special raw materials required for aircraft work were produced indigenously;
- (h) Machine tools and special plant were not available in India and were in very short supply all over the world and demands from India were already receiving low priority.

The results of the preliminary survey showed clearly the major problems to be tackled and overcome and a brief outline of these problems and the steps taken to overcome them are given in the following paragraphs:—

(i) **Organisation.**—An India-wide organisation had to be set up to control, direct and supervise the work. The organisation passed through various phases in its expansion from the original aircraft Section of D.G.M.P. to its final stage as a separate Directorate General with headquarter at Lucknow. Circles were located at Cawnpore, Karachi, Lahore, Madras, Bombay and Calcutta. Each Circle had a Repairable Equipment Depot and a Civil Repair Organisation (Mechanical Transport) and was responsible within its area for the location of capacity for repair and manufacture, providing expert advice and supervision to the civilian firms and contractors and with the assistance of the Aeronautical Inspection Service, ensured that the completed work was of the requisite standard. Civil Maintenance Units were created for aircraft work. While aircraft and aero-engines were allotted for repairs direct from R.A.F. Units to CMU's, other items and components and accessories were less easily handled. So a clearing house was set up in each circle to which units in the area despatched all unserviceable items.

(ii) **Staff.**—Personnel had to be found to staff the controlling organisation and to direct and supervise the actual work done. Local recruitment yielded small results and the Air Force Authorities had to be approached. A special mission was sent to England for recruitment from there.

(iii) **Labour Force.**—A labour force of many thousands had to be created quickly. This force was to maintain a high proportion of highly skilled tradesmen as the standard of workmanship in aircraft was of the very highest order. R.A.F. personnel in Civilian Firms and CMU's trained their own labour force to a very large degree. Higher rates of pay were offered which induced a number of skilled and semi-skilled Indians to leave other factories and join the CMU's, but the application of the National Service (Technical Personnel) Ordinance, 1940, prevented any serious interference with other war activities. Finally the D.G.A. Training Scheme was instituted utilising the pre-war Civil Aviation schools. Skilled Chinese tradesmen stranded by the war in Calcutta were also recruited.

(iv) **Capacity.**—The creation of adequate capacity for repair and manufacture work was mainly a question of availability of building materials and labour and also of transportation to the site. Hangars were essential for aircraft work and the Tata Aircraft Glider Factory arrangements were fortunately placed at the disposal of the Supply Department for this purpose. Imported Hangars were made available by the Air Forces as and when possible. Throughout, a great deal of work had to be done in the open despite dust and monsoon conditions, but even at the end of the war many were still only in semi-finished condition.

(v) **Machine Tools, Plant etc.**—A certain number of Machine Tools were obtained from Ordnance Factories but the majority had to be demanded from the UK and the USA. Large demands were placed late in 1942 but delivery was not commenced until eighteen months later and some tools were still undelivered when the war ended. This was mainly due to world shortages, low priority and the late start in comparison with other organisations.

(vi) **Raw Materials.**—Special raw materials had to be obtained or substitutes selected from indigenous material. The Air Forces in India had not previously resorted to manufacture and its demands for special raw materials, therefore, were extremely small. R.A.F. authorities in the U.K. despite strong representations refused for over a year to meet the demand. This problem was eventually solved by using the normal channels of demand and supply through the India Office but stocks of materials were not received until early in 1945. The use of indigenous materials was resorted to on every possible occasion and with the ready assistance and advice of the Air Force Aeronautical Inspection Department and the Research and Development Organisation set up by the Air Forces considerable risks were accepted in using alternative specifications.

(vii) **Technical Literature.**—Technical Literature concerning the types of aircraft, aero-engines, accessories and equipment had to be obtained in sufficient quantity to ensure a ready supply to the whole Organisation. There was a woeful shortage of such literature in India throughout the war. The Air Forces set up in late 1942 a Central Drawing Office and Technical Publications Library with arrangements for duplicating all materials received. A similar and parallel organisation was set up within the D.G.A. and the Liaison Officer attached to the India Office provided a second channel of supply to the D.G.A.

(viii) **Repair Planning and Progress.**—The types of aircraft and equipment used by the Air Forces were constantly changing and in consequence the repair programmes at C.M.U.'s were subject to rapid changes. At first such changes were made without due consideration of the effect on the C.M.U.'s in idle time or decreases and increases in their labour force. In 1944 a new Section of the Repair Directorate called the Planning and Progress was formed and at the same time the C.M.U.'s were re-organised on a planned production basis. Periodical Returns were instituted giving the Planning and Progress Section complete details of the position at each C.M.U. Before any change was made in a repair programme this Section was consulted and it produced a plan of

action to obviate idle time etc., and to prevent any violent fluctuations in the labour force. The benefits of this arrangement with a limited labour force are obvious.

Eventually also this Section paid high dividends by reducing time, labour and expenditure incurred on repairs to components and accessories in excess of those actually required in the repair programme for aircraft and aero-engines or those needed by the Air Force Units for replacement purposes. Its effect on the repair programme was shown by the evening out of production peaks and depression of a steady output return and by the rapid reduction of establishments to a correct level in consonance with the output. The extension of this principle to Civilian Firms repairing smaller items and accessories was only prevented by the sudden cessation of the War.

Conclusion.—The D.G.A.'s view is that the gravest mistake of all was for the D.G.A. organisation to be linked so closely with the R.A.F. and to rely on the Air Forces to the extent it did. In effect the D.G.A. was a miniature Indian Ministry of Aircraft Production and it should have been closely linked with that Organisation and have had liaison officers working in that Department. Had this been done many of the problems some of which remained unsolved at the end of the War would not have arisen or would have been solved immediately they arose.

It is, however, admitted that but for the ready assistance of the Air Force Authorities generally in loaning at short notice personnel, transport of every description and communication aircraft, the Department could not have operated at all. None-the-less on any future occasion such a Department should be divorced from the need for such assistance and it would prove to be in the long run far more efficient and economical.

D. GENERAL STORES

The provision of equipment and stores and medical supplies is a varied and fascinating responsibility. This is the field of non-munition supply, less spectacular but no less necessary to the successful waging of war than the provision of weapons, ammunitions, ships, aircraft, vehicles, and all the other lethal essentials of attack and defence. The scope of equipment, stores, and medical supplies is limitless, and the production is the job of a vast range of industries which in peace-time are the most numerous and important in our industrial economy.

Textiles, cotton, wool, rayon, flax, hemp, jute, and silk; clothing and hosiery; every type of medal, ribbon and badge; boots and shoes and leather goods; cordage and camouflage; narrow fabrics and web equipment; drums; hand tools and cutlery; accommodation and barrack stores and field equipment; woodware of every type; pharmaceuticals, drugs, surgical instruments, hospital stores and X-ray; hutting, floating pontoons, bomb shelters, waterproofing equipment for amphibious operations; personal equipment of all kinds from a needle to a one-man tent; obsolete and used surplus clothing and stores for reconditioning, adaptation, or breaking down—these are a few of the tens of thousands of separate items which are comprised in equipment, stores, and medical supplies.

The majority of these stores are what is known as 'Common user'—that is, they, or many of them, are required in similar, but not always identical, patterns for every section of the fighting forces.

In the succeeding pages, an attempt has been made to describe the special problems which cropped up in arranging for the above stores and the measures taken to solve them.

Clothing.—The Armed Forces clothed by India were fighting offensive and defensive campaigns in Europe, Asia and Africa; in jungle, desert, town and

village; coastal belt and on tropical seas and islands. The demands for clothing have not only been heavy in quantity and variety but have been subject to constant change in design, colour, shape and function so much so that there was hardly any standard item of clothing produced in war to the basic details prescribed in the 1939 specifications. To clothe every man and woman engaged, whatever their job, wherever they served with the best design of garment, to conceal him from enemy eyes, to protect him from enemy gas attacks, to shield him from elements made this large scale mass production work in India a serious problem.

Production of clothing as an industry did not exist in India. There was only one Clothing Factory at Shahjehanpur with an average monthly production of 75,000 garments by power-driven machines working under mass production methods. Generally speaking, except for a few good shops in each big city, the requirements of India's many millions were provided for by what might be truly called a "cottage industry". On the outbreak of hostilities, huge demands for garments began to pour in and it became obvious that the Shahjehanpur Factory alone could not cope with the work. The immediate problem appeared to be now to control and bring into maximum production the "cottage industry" referred to above and, what was just as important, how to feed it with raw materials and inspect that it produced if the astonishingly catholic and sustained demand on the tailors of India was to be met. In 1940, and indeed well into 1942, the governing factors in considering all production expansion proposals were the location of durzies, finding suitable buildings and the urgent necessity to conserve supervisory staff. To control the cutting of enormous quantities of cloth required a degree of skill and training far beyond the capacity of the man who made clothes in the back verandah of one's bungalow and the main problem of mass production of garments in India, therefore, resolved itself into four minor problems—how to store cloth—to cut it—make it up and inspect the completed garments as economically and quickly as possible. The solution was found in the 'Cutting Contract Factory'. Under this the main system employed was to cut cloth to proper patterns in the Clothing Factories which were established at Agra, Delhi, Calcutta, Madras, Secunderabad, Lahore, Sialkot and Bombay and issue these for sewing to outside contractors. Large scale contracts for 300 different items of manufacture were held by some 100 firms throughout India. Each contractor was required to pay a security deposit and effect insurance. This system operated to the benefit of durzie population who numbered 80,000 and who lived and worked in the towns and villages of India from Jhelum to Trivandrum and from the 24 Parganas to the city of Bombay. Every yard of raw material and every thing fabricated by tailors in this large organisation was not only to be properly accounted for—for which purpose every factory had an officer of the Factory Accounts Staff attached to it—but also, each item had to be properly approved as fit for service use. Hence at every factory there was an Inspectorate which on behalf of the War Department, inspected every item produced and rejected what was below standard. The Factories' final function was to pack and despatch their output as required by indentors. The administration of these Clothing Factories fell to the responsibility of the Clothing Directorate which organised five Circles, each under a Controller with headquarters at Shahjehanpur, Calcutta, Madras, Bombay, and Lahore to assist in the control, administration and expansion of activities pertaining to clothing production in their areas. The Organisation was also responsible for the upkeep of machinery, the hiring and construction of buildings, the never ending replenishment and expansion personnel and the day-to-day supplies from mills to factories of the necessary cloth, buttons and sewings for fabrication.

By all these methods, the Ordnance Clothing Factories in India supplied nearly 400 million tailored items to the Defence Services of the Empire and her Allies based on India during war. The value of production of clothing factories

from 1939-40 to end of January, 1946 comes to Rs. 131.36 lakhs. The labour force in factories and with contractors rose to over 90,000 at its peak against 800 in 1939 employed by the Shahjehanpur Clothing Factory.

Harness and Saddlery.—Owing to large expansion of the Indian Army and the extended operations of the Allied Armies in India and neighbouring areas, the demand for harness, saddlery and other army equipment increased tremendously. This had to be met primarily by the Harness and Saddlery Factory, Cawnpore, the only Government factory of its kind originally established in 1862 as the Harness Depot. It employed only 3,000 persons in peacetime. As the Army's requirements could not be met without bringing in other sources of production, in July 1940, an Industrial Production Organisation was established in Cawnpore to work in collaboration with the Harness and Saddlery Factory in developing trade production of this class of goods. Large increases in the amount of work made it necessary to expand this organisation from one with a single headquarters in Cawnpore into one comprising five Provincial Circles each having a Branch H. & S. Factory. Under this reorganisation each circle was placed under a Controller of Leather Manufactures, with his headquarters at the Branch Factory which was the centre where materials and components were collected and stored, leather and textiles were cut and issued to contractors for fabrication, and where the fabricated goods were subsequently received, inspected, packed and despatched to their destinations.

Footwear.—From a bare 100,000 pairs in the last pre-war years, the demands for footwear rose to more than six million pairs in 1943 when there began to be a progressive decline. This increased demand was mainly met by Cooper Allen and Batas and was achieved by—

- (a) working night and day shifts (20 hours a day); and
- (b) the standardisation of production, viz., the few types of footwear required for the Defence Services as compared to the numerous types required to meet the varied requirements of the civilian population.

Other measures taken to increase the capacity were installations of additional machinery, and bringing new units into production.

Silk.—In 1941, when Government decided to make parachute cloth, an anxious search was made for silk components for this purpose (silk fabric, cord, tape, threads etc.). Genuine silk was essential but was not available in India in any considerable quantities. Most of the genuine silk was spun on the charkha, but this was not suitable for precision work required for parachutes. It was, therefore, decided to start a Government Parachute Factory and to develop a pure silk industry in the country to make parachute components. To meet the immediate demands in 1941, about 300 tons of Iranian cocoons available in India were purchased and given to Kashmir filatures for reeling. The Government of India agreed to supply raw silk to H.M.G. and the latter undertook to share in the cost of the scheme for the expansion of production of raw silk in Bengal, Madras and Mysore. Accordingly in 1942, with the co-operation of H.M.G., a scheme was initiated to increase the output of filature silk suitable for parachute manufacture involving the installation of about 3,500 new basins in the three main producing areas of India viz., Bengal, Mysore and Madras. In order to improve the quality of raw silk, one fully equipped conditioning house was established in Bengal and one in Mysore (Chennapatna). A central Sericultural Station was set up at Berhampore (Bengal) with a sub-station at Kalimpong (Bengal) for research work to improve the quality of cocoons etc. Technical and expert advice was also provided.

Woollen goods.—With the out-break of war, demands for woollen goods increased tremendously. The 15 existing woollen mills in India were invited to undertake production for the Defence Services on a cent per cent. basis,

i.e., entirely cease manufacture of goods for the civilian market. In order to have close association with the Industry, a Woollen Adviser was appointed. This production was undertaken on a 'Cost plus basis' and in order that the wool required by these mills could be obtained by them at controlled prices, arrangements were made for the mills to obtain their requirements through the Buying Agents appointed by Government. Later on in July 1942, a scheme was devised for central purchase by all suppliers of woollen manufactures to Government in Northern India. Under this scheme, the Buying Agents were virtually in the position of a monopolist purchase in so far as the purchases of 'blacks' and 'greys' were concerned and it was, therefore, essential that an adequate organisation capable of keeping a continuous watch on their operations was set up. Inspectors were appointed for this purpose. Other measures taken were: working of three shifts; greatest standardisation in the manufacture of goods; training of Labour; advance of Capital by Government or the purchase of raw materials.

Rubber.—Loss of Malaya, Java, Sumatra and Burma resulted in acute shortage of crude rubber. Measures taken to deal with the situation were: restriction on export of raw rubber, imports of rubber manufactures, price control, creation of a distributing organisation for raw rubber and control of production and distribution of manufactured articles. A Rubber Control (Stocks) Order was issued for controlling the existing stocks and a Controller of Rubber was appointed. The Central Government in November 1942, established the Indian Production Board and appointed a Rubber Production Commissioner. The Board consisted of representatives of the Governments of India, Travancore, Cochin and Madras and of producers and manufacturers. Its functions were to encourage and ensure maximum production of rubber by intensified tapping, new planting, improved methods of manufacture and spraying, the distribution and maintenance of machinery, scientific research, propaganda and any other means possible. It was a co-ordinated and organised effort on the part of the Government and the producers organisations concerned to deal with the problems of the rubber industry. A scheme for Government purchase and distribution of all rubber was put into force. A Rubber Manufactures Control Order was also promulgated. To exercise economy in the use of rubber, Tyre Rationing Order, 1942 was issued and distribution of pneumatic tyres and tubes brought under control. Ceiling prices were fixed. The rubber factories were rationalised and new items developed. Increased American demands for tyres were met by the installation of Government Retreading Plants. A compensation scheme for giving impetus to rubber growers was evolved. Experiments were conducted to grow wild rubber (*Cryptostegia Grandiflora*) in the country.

Surgical Instruments & Appliances.—The peace-time surgical instrument industry consisted of a number of small manufacturers mostly ill-equipped in machinery and technical personnel and was unable to produce high quality instruments and to bear the brunt of heavy demands which were made on it during war time. Several steps were taken to modernise the industry. Early in 1941, a Director of Production (Surgical Instruments and Appliances) was appointed to formulate plans for the efficient production of instruments. Technical advice on matters relating to the selection of steel and heat treatment was provided and a Technical Adviser appointed. A Surgical Instruments Standardisation Committee was appointed to lay down the schedules of standard instruments for all branches of surgery and reduce the number of patterns to minimum. Forward provisioning, central planning and purchase were also introduced. A Committee of Surgeons known as the "Grant-Massie Committee" was convened in November 1942 to recommend what instruments could be produced by Indian Industry and what instruments should be imported.

The resources of the country were investigated and important firms were selected for development. Special efforts were made by the C.G.I. to develop the surgical instruments industry while the Appliances side was tackled by the Supply Department. Old methods were discontinued and replaced by newer and modern methods of heat treatment. The factories were gradually equipped with adequate machinery and heat treatment furnaces. The industry was able to meet heavy demands of about 25 to 30 thousand instruments a month.

Paints & Varnishes.—Paints, varnishes, enamel and distempers are of great importance in modern industry. There were heavy demands for finishes of every kind for the Army, Navy and Air Forces. India was dependent on several imported ingredients in pre-war days, survey of white and red lead stocks had to be made to conserve them and issue only against Defence Services and essential industrial requirements. Pigments like red lead, zinc oxide, prussian blue, brunswick greens etc., had to be placed under control. Turpentine and white spirit had also to be controlled. As war developed, large demands for camouflage paints, anti-gas varnish and gas resisting paint had to be met. Anti-gas varnish was developed from wholly indigenous material like shellac, glycerine and linseed oil. Nitro-cellulose dopes for application to aeroplane fabrics were produced by using waste films and other indigenous materials. There was an acute shortage of chrome colours and substitutes such as green paint formulations were developed. Co-operation of the industry was secured through a Paint Supply Panel.

Petroleum Products.—Oil is one of the principal items around which economic warfare is waged. The late Earl Balfour is credited with saying that in the first World War the Allied Nations "floated to victory on a sea of oil". In the second World War which was more widespread and more highly mechanised, the need for oil was immeasurably greater. The prodigious demands outstripped the dwindling supplies. India was dependent chiefly on outside sources of petroleum and as imports decreased, the problem of petroleum supply became serious. The peak pre-war oil production in British India was about 320,000 tons of all oil products—motor spirit, kerosene, etc., while the total consumption was 3,000,000 tons, i.e., India depended for 90 per cent. of her oil requirements on imports from Burma, Netherlands, East Indies, etc. These sources were cut off with the Japanese occupation. The requirements of military also went up enormously. India had to import for aviation purposes a spirit of a high octane value from Abadan and Iraq. The United Nations were short of tankers and this was particularly true of India whose oil requirements grew every day and which was nearer the circumference than the centre of the supply.

The oil being so important, it was realised very early that strict control would have to be exercised over its distribution and consumption and production would have to be boosted up. An Adviser on Petroleum Products was appointed soon after the war broke out. A Petroleum Advisory Committee was also set up on which the big petroleum companies were represented. Restrictions were placed by the United States on lubricants and deficiencies had to be met by exploring the possibility of increased castor oil for lubricating purposes and general use of vegetable oil as mineral oil substitutes. Lubricant shortage was also tackled by drawing up a scheme for conservation in consultation with the Commerce Department. Steps were also taken to reclaim transformer oil. A special procedure was evolved to obtain oil from America under Lease/Lend.

The War Transport Department evolved a scheme and petrol rationing was introduced for civilian consumption. Shortage of petroleum products necessitated statutory control being imposed. Road tar and bitumen were brought under control which was followed by control over furnace oil. Later diesel oil and mineral turpentine were also brought under control.

Loss of Burma which was India's mainstay for petroleum products created many serious problems. India had to depend for her requirements on other theatres. Another serious problem was shortage of tanker wagon flow. India's tank wagon fleet was quite inadequate to move the required quantities from West Coast Ports to East Coast areas. To meet increased demands for the receipt of imported motor and aviation spirits on the West Coast, arrangements were made for the dismantling and transfer to the West Coast of certain Government leased tankage on the East Coast. A pipe line from Bombay to Bhusawal was laid down. Attempts were also made to step up indigenous production. It was, however, a slow business for the refining processes conditioned the rate of production and refining depended upon imported machinery and chemicals.

The Petroleum Products Directorate of the Directorate General of Supply got considerable mass equipment of various types for supply to Defence Services for distribution to oil companies against urgent demands. A large part of this equipment was secured from existing installations at ports. This equipment consisted of underground storage tanks of small capacity, largely for air-field installations, petrol pumps and lorries etc.

Containers Development.—Containers of various kinds were required for packing and supply of different stores especially those pertaining to Miscellaneous Stores, Paints and Gases, Chemicals and Petroleum Products Directorates of the Directorate General of Supply and the Foodstuffs Directorates of the Food Department. Up to September 1942, there was not much difficulty and the firms that were getting orders for the stores gave quotations including containers and arranged for containers themselves. It was, however, felt in September 1942 that the firms were feeling great difficulties and often the quotations were very exorbitant simply because of containers' rates and non-availability. A Development Officer (Containers) was, therefore, appointed in January 1943, to explore all possibilities of meeting the demands or to advise the Directorates of Purchase Section or firms on substitutes, and develop them in consultation with the C.G.I. An Advisory Panel having representatives of the C.G.I. (M.G.O.), D.G.I.M.S., I & CS Department, I.J.M.A. (Research Department) and prominent container manufacturers was forward to assist Development Officer. His headquarters were, in the beginning, at Delhi but were later transferred to Calcutta so that he might be in close touch with the main manufacturers. Some Industrial Planning Officers were also attached to him to develop new sources of supply and expand existing ones, remove bottle-necks etc., etc.

To conserve containers, the CLAC Returnable Barrel Scheme or more commonly known as the "NO DRUM, NO OIL" scheme was drawn up in 1943 in consultation with C.L.A.C. representing the main oil business interests involved. According to this scheme all oil companies importing lubricants in full barrels from the United States of America under Lease/Lend supplied lubricants to customers only on returnable drum basis. From the empties returned to them by consumers, the companies retained any number essential for their domestic trade and reported the balance as available for disposal to any one of the Lubricants Advisory Committees at the four main ports. Karachi, Bombay, Madras and Calcutta. Thus, these surplus barrels were stocked by the oil companies on behalf of the Port Committees for the formation of the drum pool. Releases were made subject to the recipients of containers signing a C.L.A.C. form of undertaking. Approximately 150,000 barrels were released to the contractors holding Government contracts for the supply of vegetable oils etc.

The disposal of serviceable second hand containers reported available by the Director General (Disposals) at various Salvage Depots was also undertaken

by this organisation. To avoid congestion at Salvage Depots the accumulations were cleared by speedy allocation against Defence and essential requirements.

A survey was made of the capacity for all types of containers manufactured throughout the country, especially of the Madras area. The P.O.L. container programme was carried out in co-operation with the Presswork Directorate of the D.G.M.P. who undertook finishing of materials for P.O.L. containers manufacture. Constant advice was given to container manufacturers. Towards the end of 1943 when the breakdown of 44 I.G. production was visualised due to the uncertainty of the arrival of Lease/Lend drum sheets, Tatas were induced to produce 10,000 tons of drum sheets within six weeks, thus averting a serious drop in the carrying capacity of P.O.L. at a critical period in military operations.

Brass material was in short supply. To overcome this a new type of closure for 2 I.G. cans and 4 I.G. drums, viz., the Hexagon closure was evolved as a substitute for brass caps and faucets and cast iron bungs and rings. This resulted in large savings and conservation of brass. Several types of containers were developed for the Food Department and for the Q.M.G., for instance, 2, I.G. Mid East cans, jutlac containers etc. A new technique was evolved for barrel repair and strengthening of new barrels by the brazing process. Several military brazing units were established and personnel trained. The production of brazed barrels under R.I.A.S.C. control exceeded 100,000 per month. This in itself was an additional carrying capacity equivalent to the three barrel plants.

PART III
INDUSTRIAL DEVELOPMENTS AND ACHIEVEMENTS

INTRODUCTION

It is natural enough to picture the struggle between the Allies and the Axis as the clash of vast armies, air fleets and navies. But that is by no means the whole picture. A modern battlefield is simply the point of impact of the total fighting strength of the contending forces. The highly mechanised warfare of to-day engages the skill and energy of entire nations. It can only be waged successfully on the battlefields if a people's total industrial, material and manpower resources have first been mobilised behind the fighting fronts. The extent of this mobilisation, therefore, is one measure of a nation's war effort.

In the rugged history of Indian toil and achievement the war years especially 1943 and 1944 tower like a mountain peak. In these years, to a degree never before known in the record of the nation, India was mobilised in one common cause. Her men and women served on many battle fronts. The airmen flew high and fast over lonely seas and nameless mountains, over deserts and jungles. The soldier brushed the skirts of death in Sicilian dust and in the autumn rains of the Italian hills. Thousands of Indians also took part in the operations in the Eastern theatres of war. And back of them served another army, an army of men young and old—the army of the industrial front.

Their weapons were calipers and gauges, pencils and typewriters, picks and shovels, hammers and axes, pneumatic drills and welding torches. Their campaigns were fought in the murk of factory smoke and the fantastic glare of furnace hearths, in the swift bustle of the office and in the pregnant silence of the laboratory, in the caverns beneath the earth and in the shipyards by the sea. Their battle sounds were the clatter of rivetting guns, the humming of turbines, the screech of saws, the roaring of mine skips, the clangorous din of shops and foundries, the rhythmic pounding of great machines. This was the army that mined the ore and felled the timber and harnessed the waters, shaped the steel and drew the brass, built the ships and fabricated the parts and components of planes, made the guns and ammunition, swung the trucks and carriers down the assembly line. These were the men and women who mastered the craft of Krupp and Vickers in a country that had never made a modern gun. These were the workers who rivetted the plates of naval craft in yards that had never sent a ship to sea. These were the people who concentrated with delicate accuracy upon the tiny valves and wires of devices so novel in creation and so secret in their magic that their very names were familiar only to the few. These were the men who mastered the alchemy of explosives hitherto unknown, in the great shell-filling plants where death was locked in a drop of liquid, annihilation lay imprisoned in a pinch of powder.

There was a place and need for every strength and skill, for the generalship of shrewd brains, for the power of brawny shoulders and the craft of nimble fingers. There was a place and need for every pound of metal, every foot of timber, every unit of waterpower, every tool, every machine and every factory that could be adapted to the manufacture of munitions and supplies of war. Almost all human and material resources of a country that had found its strength for the first time was drawn and blended into production on a gigantic scale.

It had taken five years. There was 1940—a year of plans and small beginnings, with the first trickle of war supplies from the few sources immediately available in a land turned to the arts of peace. There was 1941—a year of construction, of conversion and expansion, of vastly broadened plans, and of quickened output in answer to the darkening urgencies of the time. There was

1942—a year of rising production, a year of objectives reached and passed in the face of perils, problems and confusions. And then 1943—a year of output so heavy that the industrial capacity and the national economy groaned beneath the stress and strain, a year that saw shifts and changes in the production flood—a turbulence of the waters in response to the altered tide of war. There was 1944—when steps were taken to reduce the strain on the country's economy and divert a portion of the resources to the civil side. There was 1945 when further measures to give relief to the Indian economy were taken and orders diverted to the United Kingdom.

India set up a mighty record of output. In volume it was overshadowed, naturally enough, by some countries; but in timeliness, variety and quality it constituted no small factor in the Allied swing from desperate defence to attack and then to splendid victory.

From Indian shipyards came 3,970 craft of all types. From Indian Ordnance Factories came nearly two million small arms and small arms units; 4,776,446 units of mortar ammunition, grenades and mines, nine million rounds of artillery ammunition and about 980 million rounds of small arms ammunition during war years. From the Signals, Instruments and Communication Industry came 315 thousand miles of single cable, over 75 thousand units of Binoculars, telescopes, protractors and other stores and over 35,000 telephones. From general manufacturing came crores of rupees worth of stores and furnishing for military establishments, crores worth of personal equipment for the Services. (From Clothing Factories alone came over 18 million battle dress blouses, over 32 million trousers, over 48 million shirts and 20 million shorts of all types. The Footwear Manufacturers supplied over 16 million pairs of ankle boots and 8 million pairs other leather footwear. The value of jute and jute products supplied by the Jute Mill Industry during war years came to approximately Rs. 70 crores. Woollen goods supplied to the Services cost nearly Rs. 51 crores. The cement industry supplied 4,394 million tons costing Rs. 16.19 crores. The value of vehicles, chassis, bodies, spare parts, tyres and tubes supplied came to 114.60 crores, while that of timber amounted to Rs. 37 crores. The dressings and bandages supplied numbered 79,348 millions valued at Rs. 846 lakhs). Pig iron production had increased to 1,423,000 tons a year—almost double the peacetime output. The production of bauxite rose from 9,000 tons in 1939 to 24,000 tons in 1945, while that of graphite and magnesite rose by 50 per cent. over the 1939 output. Power installations produced a total of 3,823 million horse power in 1944, an increase of about 1,290 million horse power over 1939 production. Mica production rose to 186,000 cwts. in 1942 against 140,000 cwts. in 1939.

Behind these cold figures lies the story of an industrial evolution of vast potential affect upon the destiny of the country. For by this prodigious effort the nation learned its own strength. The figures, imposing enough in bulk, merely suggest the magnitude of the achievement. They take on new meaning when it is realised that they were achieved not as the climax of an uninterrupted and steadily increasing flow, but in the face of constant changes which, in turn, were complicated by shortages of materials, tools and skilled labour. The dull figures speak only in mathematical terms and even to the seeing eye reveal naught of the struggle in a hundred production fronts to provide material for ships, plane parts, guns, vehicles, explosives, shells and other stores. The delivery of a thousand rounds of heavy ammunition is represented by a mere figure in a tabulation "rounds of heavy ammunitions supplied" but behind the statistics lies a wide, colourful segment of India's industrial life.

India has undergone an industrial transformation which, under normal conditions, could not have taken place in 25 years, and has emerged from a

debtor to a creditor country. It must not be forgotten that the immense benefit that will accrue to the country from this credit and the industrial evolution is very largely due to the enormous effort in the field of Supply during the war years. It is the man at the bench, in the factory or the laboratory, at the lathe or the loom or the forge, or carrying out one of the thousand other operations that go to make up the business of "Supply", who, in reality, has wrought the epoch-making change in India's industrial and financial status. It is the sweat of hundreds of thousands of men who in six years helped to turn India into an arsenal and geared its economy to meet an enemy of human freedom, ruthless in method, huge in power and fortified by years of preparation. Such matters can only be sensed between the lines of the record.

India's contribution in men and materials won the applause of all Allied nations. On the occasion of the unconditional surrender of Japan Mr. Pethick-Lawrence, the Secretary of State for India, sent the following message to the Viceroy:

"At this moment when the Allied cause has achieved its final triumph in the defeat of Japan, it is my privilege to convey to you the congratulations of His Majesty's Government in the truly magnificent part which India has played.

We in this country are deeply conscious of the vital contribution which the armed forces of India, the Princes and the people as a whole, have made, not only on battlefields but in work-shops and factories, which have transformed India into a great arsenal and fighting base. The unsurpassed gallantry and endurance of the Indian forces throughout this long and bitter struggle are beyond all praise and will stand recorded as a most glorious page in India's history.

Those who have made the supreme sacrifice in this greatest world struggle for the triumph of right over might are not here to rejoice with us today in this moment of victory, but their names are remembered with thankfulness and pride.

India with her Allies has crushed the aggressors. Now, we face the great task of restoring the stricken world and of building the universal structure of peace."

The pages that follow tell this story of India's contribution which covers the greatest use and development of Indian resources that this land has ever seen.

CHAPTER XLIX

MUNITIONS PRODUCTION

(Expansion of Ordnance Factories)

For the effective prosecution of modern war, guns, bombs, armoured vehicles, ships, aircraft, etc., are essential, and, therefore, countries where the metallurgical, engineering and chemical industries are in a highly advanced condition have an advantage over others. Munitions production, as distinct from the provision of the longer catalogue of miscellaneous articles required by the Defence Services, turns largely upon the development and the capacity of the engineering industry in any country. But rightly or wrongly, the engineering industry in India had, upto the outbreak of war, been organised on a jobbing basis and existed principally to maintain other industries and not for production in the accepted sense. When the war broke out, the main assets for production of ammunition were a young but flourishing steel industry, ordnance factories, railway workshops and excellent facilities for fabricated steel work. Main weaknesses were lack of non-ferrous metals, shortage of technicians, absence of general engineering workshops, equipped and staffed for mass production. The story of India's battle for production of munitions is thus the story of a battle over deficiencies in the industrial system, raw materials, men and machines. The range of tools and machinery available was one of the chief factors in determining the nature and volume of India's munitions output.

In 1939, it was obvious that the role of India's Defence Forces in a future war would have to be changed in the light of the increased mobility and extraordinary developed striking power of modern armies, from one of protection of India's frontiers alone to that of defending such strategic points outside India as might become her external bastions. Projects to achieve this end were formulated in 1939, even before the war.

In the beginning of the war, India had just a few ordnance factories constituting her specialised munition industry. They were producing a good many things essential for the Army. But with the change in the technique of warfare it was necessary to bring about changes in the character of their production. After the fall of France, the Commonwealth countries found themselves standing alone to face a ruthless, well-armed enemy. India could no longer depend on Britain, who herself, with her factories, subjected to continuous bombing, was forced to look on other units for vital needs of life. Shipping difficulties and the Japanese advance to the borders of India, were some of the other factors which goaded the planning and expansion of the ammunition industry.

The Chatfield Plan.—The first Plan which was the only pre-war Plan to be implemented was the Chatfield Plan. It was intended to expand all existing ordnance factories and to instal new types of machine tools necessary for the production of all types of modern weapons and ammunition. It also provided for a new factory for the manufacture of high explosives including a plant for the production of Toluene and expansion of cordite factory. This Plan when completely executed cost roughly about seven crores of rupees. Soon after the outbreak of war further additions known as Post Chatfield measures were made to the original scheme in order to facilitate the production of small arms ammunition. These comprised a number of projects, most important being a project for the expansion of India's production of small arms ammunition by 12 million rounds per month. The Cordite Factory, Metal and Steel Factory and ammunition factories were also expanded.

The E. G. (Eastern Group) Plan.—It was soon realised that India had to play a larger part in the production of armaments than had been anticipated under the Chatfield Plan. In 1940, a Ministry of Supply Mission from U. K., led by Sir Alexander Roger, visited India to examine the possibility of further expansion. The Mission accepted plans prepared by the authorities in India, in consultation with the Mission's experts, for 21 few projects, including projects of alloy steels for guns and small arms, gun forgings, bayonets, light machine-guns, gun carriages, shells, fuzes and primers, high explosives, cordite, Toluene and motor Benzol. The total cost of these projects running to over Rs. 12 crores was borne by H.M.G.

The T. P. (Transplantation) Plan.—Before the Chatfield and E. G. Plans could be fully implemented Japan came into the war. This was quickly followed by the fall of Malaya, Singapore and eventually Burma. Owing to the menace of aerial bombardment to Bengal consequent on the fall of Burma, it was decided that no new Ordnance Factory capacity should be installed in Bengal, and, further, that any of the Projects, already planned in Bengal under the Chatfield and E. G. Plans and which had not been installed, should be transplanted elsewhere. This policy gave rise to the T. P. Plan which involved the building of five new ordnance factories and the expansion of two of the factories under Eastern Group Plan. It comprised a number of new projects for further expansion of India's capacity for the production and maintenance of armaments.

The O.F.E. (Ordnance Factory Expansion) Plan.—Further expansions, in fact, became necessary after the Transplantation Plan, and a new series of Projects was started;—31 in all, of which 16 were cancelled.

Included in these further expansions were projects for the maintenance of imported types of artillery equipment, maintenance of aircraft instruments, production of light type respirators, equipping vehicles for bridging purposes.

Achievements.—The Ordnance Factories underwent a three-fold expansion during the war. Factories arose where there were just waste lands and a new army of technicians were trained to work them. Large plants have been operating for the manufacture of Toluene and Acetone. Then there are plants for nitric acid, for concentration of sulphuric acid, T. N. T. and the Composition Exploding, which is described as 50 per cent. more sensitive than T. N. T., have also been manufactured.

In addition, a number of ammunition items which were not produced before the war were produced, *e.g.*, grenades, mines, bombs, pyrotechnic stores, etc., etc. Among the more important items of armament stores produced in quantity were: 6-powder gun carriages, Tripods for light machine guns, anti-aircraft gun sites, binoculars, stereoscopes, clinometers and telescopes. In addition to armament work, the Ordnance Factories manufactured a large number of miscellaneous stores for the Defence Services and were able to extend considerable assistance to other Departments. Examples of the former are Mechanical Transport spares, dahs, entrenching tools, cranes, hangars and components for pontoons and special bridging vehicles. Among the stores supplied to other Departments were large numbers of items for the Railway and for the repair of vessels of the Royal Navy and Royal Indian Navy and Merchant Services. For this production drive thousands of tons of steel work for the new industrial buildings were fabricated, and machine tools and plant together with ancillary equipment was obtained to equip the factories.

In short the ordnance factories in India manufactured everything hurled at the enemy, by hand, rifle, mortar and gun, dropped on his head from the air, thrown at his submarines from the decks of ships, or left under a few inches of dirt to smash the tracks of his tanks. The civil workshops maintained a constant output of the many components which make up these projectiles. A number of ancillary industries which were mobilised and expanded turned out

thousands of tons of steel, brass and other metals required to make the projectiles—paints and lacquers to finish them, containers to pack them in, and explosives of various types which gave the projectiles their devastating punch.

The strength of labour force employed in Ordnance factories rose from 15,000 in 1939 to 110,000 in 1945—a six-fold expansion, excluding the large numbers of staff and workmen employed on the production of components for armament stores in Railway and trade workshops. Factory training schemes, launched to train workers for skilled jobs, turned out about 50,000 workers, managers, supervisors and tool setters, highly skilled and semi-skilled artisans.

Major schemes of water supply, electric supply, sewage disposal, etc., were carried out and new roads and railway communications were laid down to operate the newly constructed factories. Arrangements were made for housing the factory personnel. At one of the larger projects, the Housing Estate provided accommodation for 13,000 staff and 12,000 workmen and their families—the total strength of some 45,000 to 50,000 persons, equivalent to the population of a medium size provincial town in India.

The rough approximate cost of Ordnance Factories Expansion Measures was about Rs. 32 crores.

Development of the Civil Armament Production.—From the time of the Chatfield Plan, arrangements were made to use, for the production of armament components, civil capacity suitable for this work. Under this scheme, for purposes of security, planning was on a quota basis, the principle observed being that not less than 50 per cent. of the components of each store required should be produced in Ordnance Factories.

Following the outbreak of war, the quota plan was relaxed, and railway and civil workshops were employed to a greater extent in making good the deficiencies in Ordnance Factory capacity for the production of armament components. With the object of reducing capital expenditure on new Projects this policy was developed still further under the E. G. Plan. As a result of this policy three complete railway workshops were allocated to armament production, while the manufacture of components for mines, mortar bombs, grenades, etc., was developed in a wide range of civil and railway workshops, throughout India by an organisation known as the Civil Armaments Production Division. From mid 1943 onwards, however, this policy was reversed and, consequent on a reduction in the target which released certain capacity in the Ordnance Factories, armament work was back loaded from railway and trade workshops on to Ordnance Factories, thus releasing railway and trade workshops, the former to railway maintenance, and the latter to the production of consumer goods.

The attainment of high figures of finished ammunition in ordnance factories was greatly assisted by the development of this capacity in trade and Railway workshops which manufactured components. The Railway workshops produced 4.5 inch howitzer and 25-pounder shell forgings. Orders for no less than 437 items, normally manufactured in ordnance factories were placed on these workshops. These included empty shells, empty grenades, fuzes mines, A. P. shots, fused components, bayonets, release boxes, pontoon ends and centres. At the outset of the war there were about 600 workshops known to be available. At the peak period the D. G. M. P. was using 1,500 Engineering Workshops—840 for general engineering items, over, 300 for small items and 345 plus 20 railway workshops for munition components. A number of railway engineering shops embarked on the production of shell gauges and the manufacture of hand-grenade bodies. From the railway workshops came a stream of vehicle bodies, including armament vehicles, firing platforms, trench mortars, gauges for munitions manufacture, machine-tools, S. A. A. tools, grenade bodies and components, etc. Some workshops were entrusted with the manufacture of

empty fuzes for high explosive shells. The jute industry also provided a "feeder service" for munitions parts. The mills concentrated on the manufacture of base plates and transit plugs for shells, cast iron for defence uses and component parts for armoured vehicles. Their average production rose to 200,000 per month.

To sum up:—India's war-time output of ammunition was doubled, trebled, and quadrupled and increased, under certain items, 30 to 50 times. Examples are: rifles—11 times pre-war output; bayonets—20 times pre-war output; small arms ammunition—some 4 times pre-war output; guns and carriages—20 times pre-war output; guns and mortar ammunition—35 times pre-war output; and instruments—50 times pre-war output. From 1939-40 to the end of October 1945 the value of munitions production in India amounted to about Rs. 131.06 crores as follows:—

.. Years	Production (Rs. Crores.)
1939-40	3.34
1940-41	10.92
1941-42	16.37
1942-43	21.21
1943-44	27.21
1944-45	35.38
1945-46	16.63

(First seven months)

CHAPTER I

IRON AND STEEL INDUSTRY

(i) The Main Producers.

Importance of Steel in War.—Prime sinew of war, steel is necessary for making, without a single exception, every mechanical contrivance of destruction. Even where it is not an ingredient, such as in plastic items, it is essential for discovering, carrying and processing the raw materials, and for transporting the war supply to the fighting fronts. Without steel, war would still be waged with rocks and slings, bows and arrows, or hand to hand.

Napoleon said that an army marches on its stomach. It may be more appropriately said of modern armies that they march on steel. The most decisive weapons of war, tanks, guns, ships and bombs are all made of steel. Armies have to be equipped with steel weapons and have to be transported in steel-built ships or on railways working with the help of steel rails, steel bridges, steel wagons and other steel-made appurtenances. Steel structures are needed for army accommodation and steel in other forms is also needed for innumerable other purposes. Thus steel is of basic importance even more in war time than in peace.

Pre-war.—At the outbreak of war, India was making about 1,750,000 tons of pig iron in ten blast furnaces; five belonging to the Tata Iron & Steel Co., four to Indian Iron & Steel Co., Burnpur and Kulti and one to Mysore Iron & Steel Works, Bhadravati, the proportion of each in production being 57,41 and 2 respectively. The production of finished steel, however, amounted to 750,000 tons. Moreover, about 150,000 to 300,000 tons were also imported.

Of the pig iron made, about 60 per cent, was used for making steel in India, the remainder being exported chiefly to Japan, the U. K., U. S. A., Burma, Ceylon, Java and Africa or used in iron foundries in India. In addition there were about fifty re-rolling mills engaged in rolling steel billets scrap into rods and bars. Their total output was about 50,000 tons per annum. There were also a few plants *viz.*, Tinplate Company of India, Indian Steel and Wire Products Co., Guest Keen William Ltd., Burn & Co., The Kumardhubi Engineering Works, and Hukamchand Steel Co. (now called Bhartiya Electric Steel Works), which took raw steel from the primary producers, and converted it into something more readily usable by the various engineering industries. The total value of India's steel production including pig iron exported was about Rs. 20 crores. The steel production consisted of structurals, bars, rods, plates, sheets, corrugated sheets, rails, railway fittings tinplates, wires, steel castings, nails, nuts and bolts, etc. At the Government Ordnance Factory, Ishapore, Guns Shells and armaments fittings were made.

About 40 per cent. of production was absorbed by the Railways, C. P. W. D. etc., and 20 per cent. indirectly in the form of fabricated articles. Thus, even before the war, 60 per cent. of the total steel production was bought by Government. The remaining 40 per cent. was taken up by the Indian States for Railway purposes, by the makers of agricultural implements and by purely civilian commercial undertakings such as, house-building, water schemes, power schemes, expansion of engineering works, etc. The industry is located principally in the Bihar Province, because of the availability of raw materials, iron ore, coal and water.

War-Time Developments.—In the first year of war, the extra demand for steel was not great. Till the middle of 1940, only about 30,000 tons of steel

were used for direct war purposes, but by the end of 1940, military demands began to exceed the country's capacity for production.

While the Mediterranean route was safe, imports could continue, although on an attenuated scale; but after the fall of France and entry of Italy into the war, imports of steel declined. India was thus called upon to supply larger quantities of ordinary carbon steel and in addition high grade varieties like acid steel and special alloy steels for essential military purposes. Our steel producers however, rose to the occasion, but in spite of all their Herculean efforts, India was able to meet only 75 per cent. of her 1943 demands.

It thus became obvious at an early stage that such steel as was being made would have to be rationed out among the indenting Departments of Government. Consequently, a statutory control of iron and steel distribution was introduced from August, 1941. Under the Iron & Steel (control of distribution Order, 1944) the available steel was allocated to the several military Departments, Railways and essential civil users in proportions fixed by the Master General of the Ordnance in India. Roughly 70 per cent of the steel was earmarked for direct military purposes.

Various developments had been taking place just before and immediately after the outbreak of war, which made an expansion of production possible. First the older producers like the Tata Works, had been stepping up production by various efficiency methods and replacements of plant and secondly several new producers, including one large steel works, came into production. Three of the re-rolling mills had set up electric furnaces to make steel from scrap. Since then six other re-rolling mills have taken up steel manufacture by the electric processes and although the total quantity produced is not large, this increased the capacity for high quality steels.

In 1939-40, Tatas replaced one of the two old blast Furnaces by a new 1,000 tons blast furnace. A second gas-cleaning plant and a third mechanised unit of the sheet mills (among other items) were added, and a magnesite plant for the production of pea-size magnesite and magnesite bricks was also constructed. Other important additions were the Lee-Wilson sheet annealing furnace, and the two Sandberg ovens for controlled cooling of rails. Subsequently, the Company brought into operation the Benzol plant and Ingot Mould Foundry. Two 5 ton electric furnaces were installed in 1940.

Similar extensions were made at the Mysore Iron & Steel Works also. A 25-ton Basic Furnace installed during war-time along with two small electric furnaces will increase the productive capacity to about 50,000 tons, although this has not been fully utilised. A scheme to introduce the Duplex process for increasing the Steel Melting capacity of M/s. Steel Corporation of Bengal Ltd., was pushed through and is expected to come in operation soon.

The pig iron production of India which was about 1,750,000 tons in 1938 rose to about 2,000,000 tons by 1943. But in the meantime the export of pig iron gradually dropped from about 500,000 in pre-war years to 240,000 tons in 1942-43. The production capacity for finished steel rose from about 750,000 tons in 1938-39 to about 1,250,000 tons in 1943-44 and is likely to reach 1,500,000 tons when the new projects are completed, provided adequate coal and transport facilities are available.

The real test of the Indian steel industry in the war was not so much in quantities as in qualities of steel production, and in this respect also, the Indian steel industry rose to the occasion. In the first World war, Indian-made rails carried troops and munitions to the front line. In this war, not only rails, but also whole wagons including wheels, tyres and axles were constructed here and excepting locomotives nearly every thing required for railways was manufactured. The armour plate and armour piercing steel required for the fighting forces whether in the army or navy were also manufactured.

Perhaps the most significant advance in war time was the production of the alloy and tool steels required for special military purposes and for important civilian uses. Even before the war some low alloy high-tensile steel was made at the Tatas' but this was used mostly for bridge building and railway wagon work. When in 1940-41 India was cut off from the Allied Nations, the General Staff found it impossible to obtain armour plating required for the essential armoured fighting vehicles. The Tatas met the demand by supplying armour plating which stood the most searching tests. Experiments on bullet proof plates were made in 1940 and this demonstrated the possibility of manufacturing the special alloy steel required. Soon plant was laid, and not only armour plating but armour piercing steel was made. At first the production of these alloy steels came to only 250 tons per month but rose to 500 tons early in 1941, and in 1942 production reached the maximum of 1,000 tons per month. Not only bullet-proof armour plates but special alloy steel rivet bars for the fabrication of the armoured fighting vehicles were made by Tatas and this also facilitated the manufacture of this important arm of land warfare. Composite plates to withstand the attacks of 2-pounder shot etc., were also made. Other allied achievements in steel making were high speed steels for machine tools, high carbon steels for the manufacture of mint-dies and other types of plain carbon steels for high explosive shells and for rolling sheets for Ordnance requirements. Nickel steel plates for gun carriages and a special higher alloyed nickel manganese non-magnetic steel were developed for use in the manufacture of Service helmets. Stainless steels for surgical instruments were made for the first time in India.

About the middle of 1943, Tatas installed a $\frac{1}{2}$ ton high frequency furnace on behalf of Government. This furnace together with the existing two 5-ton electric furnaces are being used for the making of special alloy and tool steels. A ferro-alloy plant with four electric furnaces for the production of ferro-tungsten was also started in April for the first time and 48 tons of ferro-tungsten was produced in 1943-44. For meeting the requirements of ferro-vanadium essential for the manufacture of certain grades of tool and alloy steels, a plant for the extraction of vanadium from the indigenous vanadium bearing iron ores was established. It was also possible to make high speed (Tungsten) tool steel and hot die steels and other varieties of tool steels for mint-dies, punches, shear blades, pneumatic tools etc. Experiments were also conducted in the Tata Control and Research Laboratories on the manufacture of ferro-titanium, ferro-boron and ferro-phosphorous and explanatory work has been done on the electrolytic polishing of ferrous and non-ferrous micro-samples. Spectro-chemical analysis of iron and steel and calorimetric analysis of molybdenum and nickel have been carried out and suitable methods of analysis of minute quantity of boron in steel have been developed. It was also possible to manufacture basic refractories from low grade chrome ore, nozzles and stoppers from clays, substitute bricks for mica schist in lining Bessemer Converters and replace silica bricks by unburnt magnesite for the purpose of lining electric furnaces and develop high temperature mortar for pointing coke-ovens in place of foreign mortars used previously.

Price of Steel purchased by Government.—There were over 60 categories of steel purchased by Government and prices varied from time to time. In all, about 3.5 million tons have been supplied to the Defence Services or for purposes connected with Defence requirements from the beginning of the War to the end of November, 1945. The basic prices of steel bought by Government for Defence purposes were the commercial prices current shortly after the outbreak of war, adjusted to F.O.R. Tatanagar, and revised every six months for increases in costs. Government purchases for non-Defence purposes were paid for at commercial rates, which were uncontrolled until June 1944. For instance, the price of bars for rounds and squares below 3" and flats 1" x 5"

wide, thickness $\frac{1}{4}$ " and over) in October 1939, for Defence purposes was Rs. 167 per ton; between 1st October 1942 and 31st March 1943 it was Rs. 177 and between 1st April 1944 and 30th June 1944, it was Rs. 197-8.

Future.—The foregoing survey will show that the iron & steel industry has greatly expanded under the stress of war demands. Its total production has nearly doubled, and alloy steels and other superior steels have been made for the first time in the country. These new lines of production have not only met essential war requirements, but have also laid the foundations for important new industries like machine tools, ship-building, automobiles etc. Imports of high-grade steels will still, however, be required from abroad and it will be some time before India could meet the British and American specifications in respect of tolerances, heat treatment, etc. She is on the first path to a stable advance and if the present pace of progress is maintained, India should soon take her proper place among the steel-making countries of the world.

The transition from war-time to peace-time production need not be a difficult process in the case of this industry because very little of the production comes out of plant of highly specialised war nature; except in the case of Ordnance factories, almost the entire plant in this country, can be switched on to civil production without any serious re-adjustment. The expansion of civil demand is inevitable. Railway renewals, road and bridge works and other public works held up during the war will also call for large quantities of steel. Any economic development plan would require more roads and bridges, large construction works and various kinds of public utility concerns. All this would call for large quantities of steel in the form of structurals, rails, sheets, bars, wire and nails, fastenings, etc. The annual demand for some years to come is likely to range between a million and million and a half tons. Thus there is greater chance of supplies being inadequate to meet the internal demand, and it is doubtful if we shall have anything for export to the neighbouring countries which look to India for their steel supplies.

The problem of increasing the steel production will then face the country in all its seriousness. India has almost unlimited resources of high-grade iron ore, chrome ore, limestone, dolomite and magnesite. Excellent clays and silicon rocks are found in the country and these have already been manufactured into high quality fire bricks and silicon bricks used for lining steel furnaces. India has been producing pig iron of high quality at comparatively low costs and the fact that this found a ready market in the U.K., the U.S.A. and Japan in spite of various obstacles to trade, shows that in this respect India is on the strong side. As against this the Indian iron and steel industry may have to face foreign dumping. The American and Continental industries that had been expanded to meet the exigencies of the war will find that their producing capacity is greatly in excess of consuming power. In order to work to its maximum their vastly expanded production, equipment, both American and European producers may seek to dispose of their surplus production at a price much lower than the domestic price. Cost will, therefore, have to be kept down, all waste must be eliminated and the highest possible efficiency attained if the industry is to keep above water.

The two bottlenecks which India has to tackle are in regard to the inadequacy of coking coal and the high cost of transport. Viewed from one angle, these two bottlenecks merge into one, because coal is dependent on railway transport. It takes about ten tons of raw materials and stores to make one ton of finished steel and as distances for distribution are also great, the transport-cum-coal difficulty is rather complicated. Government is already actively considering the development of industry with a target of 2½ to 3 million tons per annum. The Iron & Steel (Major) Panel constituted under the Planning and Development Department has submitted a report which is receiving Government consideration.

(ii) RE-ROLLING MILLS

The first two or three re-rolling mills were engaged in rolling the scrap accumulated in railway workshops. Subsequently a better class of scrap was imported and billets were purchased from the main steel makers and were rolled into useful sections and bars required for construction and other purposes. From 1935, largely owing to the feverish re-armament boom in Europe, the industry got a fillip, and by 1940, the number of mills rose to about fifty. A Re-rolling Mills Association was started in 1940 to protect the members from the unfair competition of the main producers.

In the latter part of 1941, the war demand for steel became so heavy that the whole production of the re-rollers was bought for military purposes. As a result of this abnormal demand about 150 re-rolling mills sprung up. Taking advantage of this demand for special steel products, the older and better equipped of the re-rollers took up the manufacture of special steel products (these formed the A-1 Class) and others made steel by the electric process and set up foundries (these formed the A Class). Thus both these classes of mills tried to keep out of competition with the larger producers and as the Government needed their products, they were given technical assistance in the new lines of production. The real difficulty arose in connection with the B. and C. Classes which were re-rollers proper, about 90 in number. They varied widely in capacity and some of them had poor plants. Most of them had started in 1941-42. They used scrap as their raw material and their products (bar and flats) went into the hands of the village blacksmith for agricultural purposes or was used for ferro-concrete work. Some of these mills had only 100 ton capacity.

There was a great demand for the re-rollers products in the years 1941 and 1942. But by the middle of 1943 this demand had fallen almost to the vanishing point. Subsequently early in 1944 transport difficulties and the shortage of coal began to affect the steel industry as a whole and re-rollers as well as the main producers were hit by this. It then became evident that in order to make the most efficient use of available transport and coal, they should be allocated to the two main producers and the re-rollers who were making specialities. The question again came for consideration in 1944 and a scheme of compensation was adopted. But this was only a temporary solution.

There is no doubt that there is need for re-rolling mills in India. The production of plates and flats from scrap for bazar use and agricultural implements are needed in the national interest, especially in a large country like India. There is a large rural demand for Iron & Steel which has to be met locally. The problem, however, bristles with difficulties and how many of the mills will be wanted remains to be seen. The nature of state assistance to them, if any, will have to be decided upon. This will be one of the toughest problems for settlement by the Iron and Steel Panel lately appointed by the Government for making post-war plan for this important basic industry.

Recently the Department of Industries and Supplies appointed an Officer on Special Duty to advise the Department on the development of Steel Re-rolling Mills in India. He has submitted a report which is under consideration. He has recommended that continuity of operations and the supply of raw material should be made conditional upon each works taking such steps as will enable it to become economical in fuel consumption; an up-to-date properly-designed, hoop mill should be installed and most of the 'C' class mills should be eliminated.

(iii) ANCILLARY INDUSTRIES

There are various industries ancillary to steel production. Several raw materials other than iron ore and coal are required in the manufacture of steel

and as steel production advances, the supply of such raw materials is bound to develop into important industries. The principal industries coming under the category are (1) Refractories and (2) Ferro-alloys.

Refractories.—Nearly 100 per cent. of India's requirements of refractory materials, approximately 150,000 tons per annum, are being manufactured in the country, mostly in Bihar and Bengal.

During the war, capacity in other Provinces was developed and products conforming to Admiralty specifications were manufactured in the country and the Naval requirements were met from indigenous sources.

The chief refractories required are—Fireclay bricks (95,000 tons) Silica bricks (25,000 tons), Magnesite bricks (4,000 tons) and Chrome bricks (1,500 tons). The industry in war felt the want of a laboratory where all tests could be carried out and the necessity of an up-to-date laboratory for testing refractories was urged by the D.G.M.P., in 1940. The details required for the installation of such a laboratory were obtained from the U.K. and Rs. 50,000 was sanctioned for the purpose. This matter is being pursued now. Raw materials of high quality for the manufacture of refractories are available in abundance in the country.

Ferro-alloys.—All steel manufacture requires some ferro-alloy addition. The simplest ferro alloys are ferro-silicon and ferro-manganese. In pre-war days, India made all her ferro-manganese from the manganese ore of the Central Provinces. Not only is this ore sufficient for our uses, we are in fact exporting as much as 1,000,000 tons every year to the U.K. and the U.S.A. But India has no ferro-silicon and until lately the whole supply had to be imported. In 1943, the Mysore Iron and Steel Works installed 2 ferro-alloy electric furnaces. The intention was to use one for the manufacture of ferro-silicon and the other for the manufacture of ferro-chrome. But the war situation demanded that both the furnaces should be put on to ferro-silicon, because the amount of ferro-chrome used in India is only about 500 tons per annum, while the requirements of ferro-silicon are about 4,000 tons per annum. The Mysore furnaces will make about 2,000 tons per annum and we will still be dependant on imports for the other 2,000 tons.

(iv) TINPLATE

The whole of India's requirements of tinsplate which came to about 50,000 tons annually was met by imports before the last Great War. But during 1914-18 the imports were almost entirely cut off. This led to the establishment of this industry immediately after the war, and the Tinsplate Company of India came into existence in 1919. The two important raw materials are steel sheet bar (tin bar) and block tin. Iron Bar is supplied by Tatas while tin which is required in its pure form was obtained from the smelting companies of Singapore and Penang. Besides these two raw materials proper, many specialised items of equipment and stores are needed to manufacture tin plate such as chilled rolls for the Hot and Cold Rolling Mills, annealing boxes, palm oil, zinc chloride, sulphuric acid etc. All these except sulphuric acid were coming from abroad.

The production in 1937-38 was 53,431 tons and imports from the U.K., the U.S.A., Italy, Germany and Japan came to about 7,500 tons per annum. Imports began to decline from 1939.

Tinsplate is essentially needed by all the three Defence Services in war. Mechanised armies depend on tinsplate for their petrol, water, oil and grease, all of which must be packed in tins. It is also needed for packing food stuffs in operational areas, for army utensils like camp kettles, degchies, mess tins, water bottles, and gas mask boxes. In munitions also, tinsplate is essential. Nearly every round fired or bomb dropped owes something to tinsplate. It is required for lining the boxes of rifles and machine gun ammunition. Charges for big guns are stored in tinsplate containers. Fuses for small bomb and tails

and vanes for bigger ones are all made from tinplate. Depth charges also are dependent on tinplate. These increased military demands led to the expansion of the Indian tinplate industry and its output rose to 58,300 tons in 1942, 68,400 tons in 1943 and 80,000 tons in 1944. The largest increase has been in heavy gauge (26 B.G. and thicker) production in special qualities.

All this expansion has been carried out and maintained despite the loss of Malaya and its supplies of tin and palm oil, as the Company had fairly large stocks of tin. Some imports came from the U.K., the U.S.A. and China. Arrangements were also made for the supply from Kenya of sufficient ore. By confining the use of tinplate to certain essential articles such as containers for food-stuff and pharmaceuticals, mess tins, water bottles etc., the consumption of tin was reduced by about 80 per cent. All other essential war demands requiring coated plate either for anti-corrosion protection or for ease of fabrication such as ammunition boxes and ordnance stores were produced in 'terneplate'.

From 1941, all the production of the Tinplate Co., was placed under the Iron and Steel Control. Government allotted it to the various quota holders, such as the Director General, Munitions Production, Engineering-in-Chief etc. who later issued licences for their requirements. The Government also arranged for the supply of raw materials, such as, tin bar and coal to the company.

Though the war is over it appears likely that the production of dehydrated and processed foods will continue and probably increase in which case the demand for light gauge tinplate will also increase. India might also develop export markets in the East for this gauge of tinplate, particularly in areas in Singapore for the canning of pineapples; it is also probable that the development of canning in India, which received a fillip through war might absorb the bulk of the output. If the production of terneplate continues along with that of tinplate, provision will have to be made to prevent it from being used for the manufacture of containers for food-stuffs in view of its lead content. But the lion's share of the demand for tinplate is likely to come as before the war from the oil companies for packing kerosene oil.

(V) BOLTS, NUTS AND RIVETS

Another important industry associated with steel production is the manufacture of bolts, nuts, rivets, washers, dogs pikes and coach screws. These are all essential materials used for fastening structural and other engineering works. The manufacture of nuts, bolts and rivets is a necessary intermediary between the steel industry and the Engineering firms.

Before the war, imports of these articles amounted to about 21,700 tons (1936-37). In India Guest, Keen, Williams Ltd., Calcutta, were then practically the only producers. The total production was negligible and all the local requirements were largely met from imports.

When war took a serious turn, imports fell off, but a large demand for nuts, bolts and other fasteners was created by War because of their great need in structural work of the pre-fabrication and unit construction type.

The present consumption of nuts, bolts, etc., in India is about 50,000 tons. Of this, India in spite of speeding up of supplies produced only about 30,000 tons; the balance being imported from abroad. The Anglo-American Steel Mission regarded bolts, nuts, etc., as a serious bottleneck in war conditions.

Other producers than G.K. Williams lately came into the field, namely Indian Wire Products Ltd., (Tatanagar) and National Iron and Steel Works, Calcutta. During war, Government assisted the industry by (1) procurement of necessary raw material (2) supply of machinery some of the smaller machines being made in India by machine tool manufacturers under the guidance of

Machine Tool Controller and (3) supply of coal, transport and other facilities to manufacturers. Control on an all-India basis was exercised on the production.

It is likely that the total demands in post-war period will not be so great as in war time. All the same, the normal demand is likely to be greater as some at least of the new industries started in war time will continue after the war. It is also likely that house construction and Bridge works for civil purposes will increase and it is probable that the present capacity will be required.

(vi) STEEL CASTINGS

Before the war, the principal foundries specialising in steel castings production were—Kumardhubi Engineering Works, Kumardhubi; Hukumchand & Co., Calcutta; Burn & Co., Calcutta; and the B. B. & C. I. Rly. Workshops at Ajmer. The combined annual production of the above firms was about 4,500 tons before the war exclusive of Indian Ordnance Factories.

The war gave a fillip to the industry by creating a demand for all kinds of castings which although formerly were imported had now to be produced in India owing to import restrictions. Not only were existing foundries fully extended but the use of substitute materials was resorted to until such time when several new foundries set up to meet the increased demand acquired a certain amount of skill to produce consistently good steel castings. The total production rose to about 6,000 tons in 1942 and 8,000 tons in 1943.

Some of the foundries have specialised in the production of ammunitions. The Kumardhubi Engineering Works deserve special mention in this respect. This firm did pioneering work in the manufacture of trench mortar and aerial bombs. With the help of lathes and other equipment designed at its own works, trench mortar bombs were manufactured on a mass production basis (35,000 bombs per month in 1943). This firm can take credit for the manufacture of aerial bombs also. Subsequently these lines of production were taken over by the Ordnance Factory at Muradnagar, and the steel foundry output of the Kumardhubi Works is being used for new and maintenance parts of wagons and locomotives, manganese steel castings for cement works, castings for the coal trade etc.

(vii) WIRES AND WIRE PRODUCTS

The chief producer in this field before the war was the Indian Steel and Wire Products Ltd., Jamshedpur, which began production on a small scale in 1928. At first imported wire rods were used for wire drawings. But in 1932 the Company installed its own Rod Mill for the manufacture of wire rods. The main products were Rods below 1/2 in. in diameter, Hard bright wire, Annealed wire, Galvanised wire, Wire nails, Barbed wire, Bolts, Nuts and Rivets. The annual production of the above articles consumed approx. 50,000 tons of billets.

After the introduction of the Iron and Steel Control, the Indian Steel and Wire Products Ltd., concentrated on the manufacture of articles for Defence purposes. This meant production of new kinds of wire. Other small firms have also entered the field.

The present production capacity of Indian Steel and Wire Products Ltd., is as follows:—

	In tons per month.
Bars and wire rod	5,000
Hard bright and annealed wire	3,600
Galvanised and telegraph wire	600
Barbed wire	500
Wire nails	1,200
Bolts, nuts and rivets	75

But the above capacity is not worked to the full owing to the reduced supply of billets. From January 1944 there has been no demand for barbed wire and this has led to the closing down of the barbed wire plant. For wire nails too the demand has fallen largely and it is now far below the production capacity of the Company.

In the matter of quality, the products of Indian Steel and Wire Products Ltd., can now claim to be on a par with the imports. The other producers than the National Screw and Wire Products and the Indian Hume Pipe Co., are small concerns. Now imports from foreign countries, especially from America, which made vast provision for additional industrial equipment, may hit indigenous production. This question will deserve careful consideration.

CHAPTER LI.

MACHINE TOOLS.

1. **Introduction.**—In peace or war the machine tool and small tool industries hold the key to all production, whether it be the plough or fieldgun, spinning machine or aero-engine, the simple yardstick or the radio locator, all derive their being from the products of these industries.

Machine tools are the basic tools of industry. Famous as "machines that make machines", they not only reproduce themselves but turn out manufacturing machinery for any and every type of industry. They are used in 80 per cent. of the work involved in the manufacture of guns, ammunition instruments, and countless other items required in the prosecution of the war. Before tanks, aircraft and guns can roll into service, factories must be provided with machine tools. The term "Machine tool" is used for all mechanical contrivances for cutting, forming, abrading, polishing or otherwise working or treating wood or metal. Machine tools are themselves machines, and without them modern industry cannot function.

Broadly speaking, the term "Machine Tool" can be taken to cover any power-driven apparatus for working on metal. The lathe, with its many descendants, is the essential machine tool, but machines for planing, drilling and stamping metal also fall within the definition.

In the average machine tool the actual "tool"—the cutting edge that bites into the metal—must be made of sterner stuff than the metal it shapes. Just as Stone Age savages sought out the hardest rocks with which they chipped softer rocks into their primitive weapons, so today's industry seeks out the toughest and hardest of alloys for its "tool steel".

There are many other devices for special purposes—slotting machines, broaching machines, sawing machines, gear-cutter, thread-cutters, automatic screw machines etc.; for a final smooth finish—grinding, honing and lapping machines, each of these machines may be built for one or two purposes: (1) for individual jobs, all purposes or machine shop tools and (2) single purpose or mass production-line tools. In the first group are flexible, adjustable machines, operated by highly skilled machinists, capable of converting an engineer's blue print into metallic reality. These are the master "machines that make machines".

Machines of the second type, designed for mass production, are not flexible but specialised. Here multiple tools are the order—a set of drills, a group of cutters, working away simultaneously or alternatively. Instead of an ordinary lathe there is a turret lathe—half a dozen tools mounted on a revolving turret taking their successive specialised cuts at the work. These machines are partly or fully automatic. The mass production-line tool has made possible the turning out of billions of bullets, hundreds of thousands of shells and countless thousands of other war supplies.

In India the great majority of the machine tools made are of the general type: (1) Lathes, capstan lathes; (2) Drilling machines, (3) Chucks; (4) Planing machines; (5) Shaping machines; (6) Milling machines; (7) Sawing machines (metal and wood); (8) Grinding and polishing equipment; (9) Presses, punches and shearing machines; (10) Welding furnace equipment and (11) Miscellaneous

Importance of machine tools.—One of the clearest lessons the war has taught has been the vital importance of the machine tool industry. It is not often.

however, that machine tools appear thus as a direct and primary contributory to production. They do so in war-time only because machinery and metal goods generally are the end-product of war production. In peace-time, not much metal is directly consumed, and the chief need for machines is to serve as producers' goods—that is, to assist in making other goods for consumption.

Machines and machine tools are the most dreaded bottlenecks in any war-time production. Procurement of machine tools constitutes one of the great problems in expanding the production of war materials. Practically no finished material products can be produced in quantity without these tools.

2. **Before the war.**—There was no regular machine tool industry in India though various machine tools such as Hydraulic presses, Milling machines and Planers were made in the larger engineering workshops. Lathes and ordinary milling machines made on mass production methods were generally imported as the import prices were cheaper. Before the war, machine tools worth about Rs. 30,00,000 were imported annually, mostly from the United Kingdom and Germany and a small percentage from the U. S. A. and Japan. The most serious handicap was the shortage of middle class engineering craftsmen. Moreover, owing to the imports there was no incentive to the local industry. Thus India had to make up a large lee-way when the war broke out.

3. **In war-time.**—(a) *From September 1939 to December 1941.*—When the war broke out, not more than 100 machine tools were being manufactured in India per annum and these too by manufacturers purely for their own use. Jessop and Co., were considering the question of manufacturing machine tools on a mass production basis. A number of other firms such as India Machinery Company Limited, Dasnagar; Britannia Engineering Co., Ltd., Titaghur; Cooper Engineering Co., Ltd., Satara; Kirloskar Brothers Ltd., Kirloskarvadi also were interested and were trying to plan manufacture of machine tools and enlisted the assistance of the large Import Houses who helped them in planning their manufacture and training their workmen. These firms began with very simple machine tools such as Shaping machines, Drilling machines, Presses and Hacksawing Machines.

Early in 1940 the Supply Department realised the importance of the Machine Tool Industry and in June 1940 a compulsory census of machine tools was undertaken by it with the assistance of Factory Inspectors. After the fall of France, it was felt that if India's industrial war effort was to be developed to the full extent, it was essential that the machine tools production should be stepped up. A Machine Tool Control was, therefore, established and a Machine Tool Controller appointed. Also an Advisory Panel composed of representatives of users, importers and manufacturers of machine tools was formed to advise and assist him.

The Controller ensured that machine tools of the required types were available in sufficient numbers for war purposes and were put to the best possible use. He advised and encouraged all actual and potential producers of machine tools and gave them technical assistance (e.g., in the matter of types, designs, methods of production and like).

To enable the Controller to have adequate information of the machine tool position, and exercise effective control over the use of machine tools, certain powers were conferred upon him by The Machine Tool Control Order 1941, which came into force on March 1, 1941.

The effect of this order was briefly as follows:—

- (1) The term "Machine tools" was defined so as to include appliances for "training" wood and metal (e.g., certain types of furnace) and certain machine tools were scheduled and described as "Scheduled machine tools";

- (2) A licence was required for the import, production, keeping for sale, and sale of scheduled machine tools.
- (3) An authorisation was required for the acquisition of any scheduled machine tool;
- (4) The Machine Tool Controller was empowered to fix prices for scheduled machine tools, to requisition machine tools, to inspect, or arrange for the inspection of any premises in which machine tools were produced, kept for sale, sold, or used to call for certain information in respect of machine tools.

The Machine Tool Controller had to meet by local production as much as 60 per cent. of India's requirements. With this target in view every manufacturer who showed interest and possessed the necessary plant was encouraged to take up manufacture. As the response was poor it became obvious that a scheme of rationalisation both of "orders" and of "manufacture" was necessary.

In addition, a scheme was framed in 1941 to create a reserve of machine tools in the country as a safeguard against delays and possible interruptions in the arrival from abroad. The Machine Tool Controller evolved a scheme for the expansion of five of the more experienced machine tool manufacturing firms in India, with a view to increasing their combined output by a further 100 machines per month.

These firms were provided with balancing equipment which the U. K. and U. S. A. authorities agreed to supply. In order to assist manufacturing firms in India a team of seven experts in building of machine tools of all types selected from the main tools manufacturing firms in England with full knowledge of methods of manufacture, erection and inspection was brought to India. They surveyed the industry with a view to rationalisation, laid down standards for grading manufactured machinery and in general assisted the industry in technical manufacturing problems and advised on general lay-out of the workshop and methods of planning, costing and rate fixing, etc. As a result of this effort, a number of machine tools of good quality began to be manufactured in India.

(b) *January 1942 to up-to-date.*—By 1942 well over 100 licensed firms in India were manufacturing machine tools of various types ranging from simple drills and lathes to special purpose machines required for munitions production.

With a view to further expanding the production of the higher class machines, a scheme costing some Rs. 15 lakhs was approved. The scheme enabled the firms selected for the purpose to produce 80 to 100 such machines per month with prospect of further expansion at a later stage.

(c) *Bulk ordering of machine tools by Government.*—About 1942 Government took over the bulk ordering of machine tools on manufacturers of Indian-made machine tools and their distribution to users. Prices were fixed on the basis of estimated costs of production plus a percentage varying generally from 15 to 20 subject to the maximum statutory prices notified by Government for Indian made machine tools. Licensing was limited to those firms who had fair chances of success in making tools of reasonable standard. The policy of the Government was based on (a) selection of the most promising firms for a specific number of items and (b) bulk manufacture which seemed essential for fostering the industry.

The system of bulk ordering was helpful to the industry in the beginning. Early in 1944, the Machine Tool Controller stopped placing bulk orders on the manufacturers, but licensing system was retained on the basis of the rationalisation measures and manufacturing licenses were issued to the firms according

to their forward manufacturing programme. Maximum prices were fixed statutorily. Manufacturers holding licenses were given assistance to procure steel and other raw materials.

Machine tools imported for requirements other than Defence Services and Oil Companies in India were distributed through the importing houses. The distributors arranged for warehousing of such machines and distributed under directions of the Machine Tool Controller. For these services, they were paid an Agency fee.

4. United Kingdom Machine Tool Mission.—With the adoption of India as the first base for operations by the South East Asia Command, it became extremely important that India should have an adequate supply of suitable machines for the repair and maintenance of aircraft and aircraft ordnance, naval and civilian ships, motor transport vehicles, locomotives and rolling stock etc. An Advisory Mission of experts headed by Sir William Stainier, was, therefore, sent by the Ministry of Supply in the U. K. to India and arrived here in July 1944 for taking stock of India's resources in this line and to recommend such adjustments, as were essential. Its terms of reference were:—

“To take stock of India's resources of Engineering plant and Machine Tools, with particular reference to the repair and maintenance of the following items:—

- (a) Aircraft and Aircraft Ordnance;
- (b) Ordnance including Carriages, Mountings and Ammunition;
- (c) Naval and Civilian ships;
- (d) Motor Transport Vehicles; and
- (e) Locomotives and rolling stock.

To advise on the best use thereof for the purpose of carrying out objective of making India the first base for operations by South East Asia Command..

To recommend such adjustments of the distribution of machine tools as may be considered desirable and to suggest measures for their improved utilisation.”

The Mission reviewed the position in respect of Industry's ability to cope with the demands of the war. They emphasised the necessity of creating a class of middle class craftsmen which in their opinion is the first fundamental requirement for a successful machine tool industry. They suggested an intrinsic course of training for middle class craftsmen and the desirability of collaboration between the industry and the technical schools in the matter.

The Mission recommended a census of machine tools in workshop and factories to be made. They suggested that the production programme should be static without any violent changes. They held the view that for the maintenance of aircraft, motor transport and tanks, every effort had been made in India to obtain sufficient machine capacity to produce the necessary spare parts. They suggested creation of a reserve pool of machines. As regards aircraft and aircraft ordnance, they thought that manufactures should be restricted as far as possible to the items of simple nature, such as drop-tanks, air-borne supply apparatus, etc., They agreed that a number of firms were aiming at the simpler form of machine tools such as lathes, shaping machines, drilling machines, etc., satisfactorily. They laid emphasis on training of staff to put the industry on a proper footing.

5. **Future (post-war).**—The production of machine tools is a highly specialised industry, requiring huge outlays of capital, and it can reasonably be expected to flourish only when there are large basic engineering industries to support it. In India, such industries are still in an embryonic stage and will take some time to grow. But, meantime, a start has been made with her machine tool industry and the progress has so far been encouraging. The expansion measures already mentioned were directed towards the following objects:—

- (1) Increase India's contribution towards the war effort;
- (2) reduce the necessity of importation and save valuable shipping space; and
- (3) establish on a firm foundation a machine tool industry for peace-time India.

In the post-war, it is felt that there would be no place except for those who could come to the highest standard. Designs are of great importance in machine tool industry. If the industry now adopts seriously the Machine Tool Controller's policy to produce high-grade machine tools at competitive rates for a competitive market, it should be able to take care of itself. It can look forward to a good future as demands will continue to rise owing to general industrialisation. Technicians who have been trained will continue to be employed. As regards raw materials, high class steels are now being manufactured in India and the need for imports is likely to go down. Quality and standard, however, are the most important requirements of the industry.

The principal machine tools manufacturers are Messrs. Jessop & Co. (Lathes, circular cold saws etc.); Cooper Engineering Works, Satara (capstans, drilling machine, etc.); Britannia Engineering Co. Ltd., Titagur (Lathes, grinding machines, hack-sawing etc.), India Machinery Ltd., Howrah (Lathes etc.); Maya Engineering Works, Calcutta (Drilling machines); Sir Ganga Ram Hari Ram, Lahore Cantonment (Lathes etc., etc.); Batala Engineering Co., Ltd., Batala (Lathes, Drills, etc.).

2. **Small Tools and Implements.**—Under this are included (1) hand tools such as pick axes, shovels, chisels, hammers, screw drivers, spanners etc. (2) metal cutting tools like twist drills and (3) wood working tools.

Pre-war.—Before the war India was supplying only a small percentage of these small tools. Most of them were imported. The centres of production for light tools were Calcutta and Bombay and Punjab for heavier items of agricultural implements. As regards agricultural tools like pick axes, shovels, chisels etc., Indian production was large enough to meet a good share of India's demands. Agrico Ltd., Tatanagar, Mysore Tools Factory, Mysore, and Metal Works, Shoranpur (Cochin State) were the principal producers. The production of Agrico used up nearly 5,000 tons of steel.

Developments during war-time.—Owing to stoppage of imports and increasing demands, India had to fall back on her own resources. Tools of the types such as pick axes, shovels, hammers, carpenters' chisels, screw drivers, drills, implements entrenching heads etc., have been made in lakhs.

Metal cutting tools are generally all imported, except twist drills which are manufactured by the India Tools Manufacturers (Bombay). Wood-working tools such as band-saws, circular saws, web saw etc., are all imported. Imports were arranged by the Timber Directorate through Panel and Non-Panel firms as well as on Government account. Special distribution arrangements were made through representatives of the Provincial and State Forest Departments.

As regards agricultural implements, these consist of ploughs, barrows, cultivators, sugar cane crushers, sugar cane pans, decorticators, chaff cutters etc. Production has been reduced during war-time owing to paucity of raw materials—steel and cast iron. Agricultural implements being produced mostly by Kirloskar Brothers, Kirloskarwadi; P.S.G. & Sons, Coimbatore; Cooper Engineering Ltd., Satara; Batala Engineering Works, Batala; Beharimul Gulzarimul, Patna; Benwick & Co., Kushtilia and Behari Engineering Co., Jamshedpur.

Future.—Demands for pick axes, shovels, mamooties etc., are being met by Indian production. In the matter of agricultural implements, the Indian production can meet peace time demands. The quality of Indian implements is good enough and they can successfully compete in the market, but in case of special tools such as files, Indian products do not compete with imports as Indian producers have not got the special equipments.

CHAPTER LII

NON-FERROUS METALS

1. **Introduction.**—Copper, zinc, lead, tin and nickel—the major non-ferrous metals other than aluminium—are vital sinews of war, as well as being of fundamental importance to industry in peace-time. In peace-time these metals are widely used in the electrical industry, in building, motorcars, general engineering, factory and household equipment, chemical plant, food processing and canning, and in a great variety of smaller applications.

In war-time there is a large demand for brass (copper and zinc) for shell cases and fuses; copper wire and cables are needed for military communications, and there is a large indirect military demand for the wiring of war factories and aerodromes; zinc alloy diecastings are used for fuses, zinc sheets for battery cans, and zinc oxide and zinc dust for smoke mixtures for concealment of military operations; lead is primarily needed for cable sheathing and for batteries, for naval craft and military vehicles, and there is also some demand for lead for ammunition purposes, although this has been much smaller than in the war of 1914-18 owing to the replacement of shrapnel by high explosives; nickel goes primarily into alloy steels, though it is of great importance in Radar equipment and aircraft in particular; and tin is required for food canning for military stores and for bearing metals, bronzes and solder.

In general, therefore, there was at the outbreak of war the prospect of a large war demand for the above metals, super-imposed on an already large peace-time demand.

India is deficient in regard to the essential non-ferrous metals such as aluminium, copper, lead, zinc and tin. These minerals have important industrial uses and are essential for Defence purposes. India had ample supplies of bauxite, but the production of aluminium only started during war. Copper supplies too are small. India has no tin, or cobalt or nickel. Deposits of antimony, lead and zinc are also very meagre. India is, therefore, dependent on imports or on the recovery of scrap. Before the war, the non-ferrous metal industry was practically non-existent from the point of view of processed metals, the Indian Copper Corporation being the largest concern. Copper obtained from smelting of Indian ore was turned into brass by adding imported zinc. Apart from this concern and a few small well equipped concerns making alloys of white metal and yellow metals, the non-ferrous metals industry could be termed a cottage industry.

When the war broke out, the U.K. and the U.S.A. established the Combined Raw Materials Board and the U.K. a Non-ferrous Metals Control. In India too drastic steps were needed to economise their use. The introduction of control in India bristled with administrative difficulties as the metal business before the war did not pass through well-defined channels and there was no regular agency for scrap.

2. **Impetus given by the War.**—Owing to increased war demands and shortages of imports India had to fall back upon her own resources. A Non-Ferrous Metals Control Order was issued in 1942 which covered Tin (Foil, Wire, Ingot, Whitemetal and Solder); Lead (Collapsible tube, Wire, Ingot, Pig, Antimonial lead, Whitemetal, Solder, Pipe, Tube, Sheet and Foil); Copper (Sheet, Foil, Pipe, Tube, Rod, Ingot and high Conductivity wire, Strip and Tape); Brass (Wire, Ingot, Sheet, Pipe Tube, Rod and scrap whether ingot form or otherwise), Zinc or Spelter (Wire, Sheet, Rod, Sections, Dross and hard zinc or spelter and also Ingot, Cake, Slab and Granulations) and Antimony (Ingot). Producers or

importers had to take a licence from the Controller (the D.G.M.P.). No one could acquire any non-ferrous metal from an importer or producer without a permit. As a result of the increased war demands, the industry got a fillip and has made great strides in the production of non-ferrous metals and alloys and the greatest development has been in the production of processed metals such as wire, strip and rod, various alloys, pipes, tubes, etc., required in Electrical, Automobile, Shipbuilding, Aircraft and other industries, a field which had hardly been touched before the outbreak of war.

India's main trouble has been the lack of the basic raw materials. Apart from aluminium, copper is the only metal being produced in any quantity and that limited to the one group of mines, the life of which is problematical. Further the quantity produced is far below India's total requirements necessitating import of ingot or rod for such items as cable manufacture, jari industry, alloy manufacture and for the infant processed metal industry. India also largely depends on imports for lead, zinc and tin.

3. Production of virgin non-ferrous metals.—(1) Antimony.—Antimony is a metal of some importance for munitions. The industrial uses of this metal and its compounds are legion the most important being for hardening alloys, for match industry, for the preparation of white metals and printing alloys.

Antimony has been produced by Star Metal Refinery, Bombay. The ore is mined in Chitral and brought to Bombay for smelting. Transportation costs are high and the fact that the ore has to be man-handled over a mountain pass which is closed during the winter adds to their problem. Thus the prospect of their survival depends entirely on their efforts to minimise their transportation costs. The firm has already applied to the Indian Tariff Board for protection and the matter is under examination. The firm is also planning a post-war programme with a view to installing a concentrating plant at Chitral and improving the melting process.

2) Copper and Brass.—Even as long ago as 1915-16, the Cape Copper Company, Limited, opened up a mine in Singhbhum and installed a complete milling and smelting plant, their production being a thousand tons per annum. At present smelting of copper is being carried on at the works of the Indian Copper Corporation at Ghatsila. As the firm have no electrolytic refining plant, the product is inferior. Fire-refined copper is produced but a small portion of nickel remains with it. India, therefore, has to import all her electrolytic copper. The Company, however, produce brass sheets successfully.

India produces about 7,000 tons of copper and about 14,000 tons are imported. Brass worth about Rs. 1½ crores is also imported, this contains large amounts of copper. Similarly electric machinery which is imported also contains a lot of copper. Deposits of copper are known to exist in Sikkim, Gharwal and Almora in U.P. and deserve careful prospecting.

(3) Lead.—Before the separation of Burma, lead supplies were obtained from Bawdwin mines there. The consumption of lead increased owing to degrading of white metals and solders, and its use as a substitute for aluminium in the lining of tea chests. Lead deposits exist in various parts of India and some deposits have been developed, but it is generally held that the deposits are not economically workable. The lead zinc deposits of Zawar in Mewar State (Rajputana) are being worked. There are also deposits in the Jaiwar State.

A small lead smelter was started in Bihar by the Metal Corporation of India Limited, Calcutta. The Company propose to expand their activities but unless ore supplies are forthcoming, they cannot be considered as a potential source of supply for the total requirements of India.

(4) *Tin*.—Tin is essential for the manufacture of anti-friction metals and solders. India had been dependent on Malaya and Burma. With the loss of the two countries, supply position became acute. Tin, therefore, had to be strictly rationed and consumption was reduced from about 2,500 tons to 1,500 tons in 1943. Tin smelting was attempted in a small way by H.G. Refinery, Konnagar, but with the loss of Burma no ores were available for smelting.

(5) *Aluminium*.—The history of aluminium industry in this country dates back to 1900, when a company called the Indian Aluminium Company was formed. The activities of this company were confined to the aluminium hollow-ware industry, but even so it did not make much progress and soon went out of existence.

The first positive step in the direction of development of the aluminium industry was the formation of the Aluminium Corporation of India, Limited, followed shortly afterwards by the formation of the Indian Aluminium Company (then Aluminium Production Company of India) which are now the only two producers of aluminium in India. The Aluminium Corporation has all its works at Jayakaynagar near Asansol in Bengal in the vicinity of its own coal mines. The works include an alumina plant, a smelter, a small rolling mill and a power-house, all in the same premises.

The Indian Aluminium Company (then the Aluminium Production Company of India) started as a purely foreign concern. This Company started with rolling mills, which were under construction at the outbreak of war, and later put up the smelter at Alwaye in the Travencore State with the active assistance of Government. The alumina works are now under construction at Muri (Bihar) and are expected to commence production in January 1947. Their rolling mills started production in August 1941 and the smelter in March 1943. The present output of both these companies of Aluminium Ingot, Sheets and Circles is about 3,000 tons per annum.

Shortly after the outbreak of the war, it became apparent to Government that the fullest advantage must be taken of the possibility of production of aluminium in India. Several conferences were held between the representatives of the two concerns and officers of the Departments of Supply and Commerce with a view to importing the remaining machinery and commencing production by the earliest possible date. Apart from facilities for procurement of machinery, the assistance extended by Government took the following forms:—import of alumina and cryolite free of duty; priorities for the supply of structural steel as well as for the supply of machine tools for maintenance; technical advice during the installation of the boiler-house and power plant for the Corporation; bringing of experts from Canada to help the Corporation to get its alumina plant running properly and efficiently. Government also gave an assurance to give such measure of protection against unfair foreign competition after the war, as might be necessary to enable them to continue their existence.

The industry has already applied for protection to the Tariff Board and the matter is under consideration.

4. *Refining of non-ferrous Scrap*.—Where there is a paucity of virgin metals, every effort is made to refine the scrap. India, however, has not given sufficient attention to this problem and scrap available in the country before the war was shipped to Japan and Germany at nominal price. Only the recovery of Yellow Metal scrap for making domestic utensils was going on. Very little was done in the field of white metals recovery. War, however, necessitated the use of scrap. The collection of non-ferrous scrap was encouraged. In spite of foreign competition, there is good future for refining of scrap.

5. *Non-ferrous Metals Manufactures*.—(i) *Wire*.—Brass and electrolytic copper wires have innumerable uses in electrical engineering. Apart from the

Indian Cable Company Ltd., who produce electrolytic copper wire from imported black copper rod and the National Insulated Cable Co., who manufacture their own rod from imported electrolytic ingot, India only produces small coils up to about seven lbs. in weight, whereas imported wire may be in coils up to 1 cwt. in weight. The advantage of heavy coils is obvious when the wire has to be consumed in automatic machines.

The price of wire produced in India at present is two and three times more than that of imported wire. This is due to the high price of the metal. Firms should be allowed to import modern continuous wire drawing equipment and diamond wire drawing dies to cover the smaller gauges. Wire drawers will have to educate themselves to realise that the tool room is one of the most important shops in their plant, and should be equipped and run accordingly. Annealing equipment will have to be given more attention. Electric muffle furnaces will no doubt find their place in the industry, but improved designs of coke, coal, gas or oil fired furnaces will produce a satisfactory product. Close annealing furnaces will probably follow as added improvement.

(ii) *Sheet and Strip (brass and copper).*—The Indian Copper Corporation Limited, Ghatsila, are the largest producers of hot rolled sheets in India. However, they only roll sheets down to 21 S. W. G. approx. Before the war sheets finer than this gauge were imported. The Venesta Lead Mills Limited, Kamarhatti, have done admirable work in cold rolling brass and copper sheet to gauges as low as 50 S. W. G. They have first class equipment including nickel chrome steel rolls with modern roll grinding lathe together with expert supervision. There are no other firms capable of producing sheet and strip to accurate gauges as they have no steel rolls or grinding equipment. Some firms have been carrying out a certain amount of coarser cold rolling in the higher gauges also. To maintain the production of cold rolled strip in the post war period one or more of these firms should be allowed to import a cold rolling mill with steel rolls together with a roll grinder.

(iii) *Rods and Bars (brass & copper).*—During the war India has become almost self-supporting in her requirements of round brass rods and bars, which have been produced by hot rolling billets, in sizes ranging between $1\frac{1}{2}$ " and 3" diam. These bars are not likely to be accepted by consumers after the war as they vary from the nominal diameter by $1/32$ " maximum—Nil, have a relatively poor surface, the physical properties are not exceptionally good, and the machining properties are not very good. Consumers will insist on extruded specification bars and rods now, and, therefore, to keep this industry going the importation of an extrusion press, complete with ancillary equipment, will have to be allowed. The bulk of hot rolled bar is being supplied by (1) the Steel and General Mills Co. Ltd., Moghulpura, and (2) The Kamani Metal Refinery & Metal Industries Ltd., Jaipur. Brass and copper bars below $1\frac{1}{2}$ " diam. have been produced by cold drawing by some firms at reasonable prices. On the other hand the prices paid for cold drawn bar have been high, and would not stand a chance against the prices of imported bar. However, if a modern extrusion press is laid down, there is no reason why the price should not be as cheap as that of imported bar. India has only been able to produce hexagon, square and rectangular sections with difficulty and at great expense, but with an extrusion press could easily compete with imports.

(iv) *Lead Pipes.*—India's capacity to produce lead pipes even now exceeds the demand.—Messrs. D. Wallie & Co., Ltd., Calcutta—are the only producers

(v) *Lead Sheets.*—India so far is only capable of producing lead sheet up to 3 ft. wide. With this limitation it will not be possible to compete with outside producers after the war as lead sheet is invariably demanded in widths up to 8 ft.

(vi) *Bearing Metals, Gun Metals, White Metals, Phosphor, Bronze, Etc.*—India has produced large quantities of these metals in the cast form during war, and has now reached a high degree of perfection. It is considered that the market can be held in peace time with but little additional assistance to the manufacturing firms. At present prices are high compared with imported standards, due to the high prices of basic metals. The chief producers of these metals are: (a) The Indian Smelting & Refining Co., Ltd., Bombay; (b) The Indian Standard Metal Co., Ltd., Bombay; (c) M/s. Gerhart Gabriel, Bombay; (d) The Binani Metal Works, Ltd., Calcutta; (e) The Bengal Ingot Co., Ltd., Calcutta; (f) The Kamani Metal Refinery & Metal Industries, Ltd., Jaipur and (j) M/s. The Eyre Smelting Co., Calcutta.

(vii) *Tubes (brass and copper)*.—Up to date little progress has been made in India on the manufacture of seamless tubes. A few concerns are now making feeble efforts to produce tubes by crude methods. M/s. Madhoram Moolchand, Karachi, have been pioneers in producing copper tubes in sizes up to 1/2" by rolling over a mandrel, but their price is very high and capacity limited.

(viii) *Plumbago Crucibles*.—During the war manufacture of plumbago crucibles for metal melting has made great strides in India. The principal firms engaged on crucible manufacture are (a) The Himalaya Potteries, Ltd., Balawali; (b) The Patna State Graphite Co., Ltd., Titilagarh; (c) M/s. Jhaveri & Co., Ltd., Calcutta; (d) The Indian Crucible Works, Rajahmundry and (e) M/s. Alladin Virjee Nathani & Co., Ltd., Bombay. So far only the smaller sizes of crucibles have been manufactured which are not comparable with imported brands of crucibles as the firms have been using Indian graphite of a varied composition and structure. Crucible mixtures require graphite flake rather than powder, and the carbon content of Indian graphite is far below the desired figure of 90 to 93 per cent. However, it has now been possible to import Ceylon graphite of 93 per cent. carbon content and of a flake structure.

(ix) *Electroplating*.—The electrodeposition of metals has made good progress during the war particularly of copper, nickel, tin, cadmium, chrome and zinc. Hard chrome plating of steel components was introduced and has been most successful. Anodising of aluminium and its alloys is being undertaken both as a decorative measure and as a means of corrosion prevention. India is now in a position to produce some of the ingredients which are necessary to carry out these operations such as copper salts, chromic acid, tin anodes, copper anodes, antimonial lead anodes, etc. Metal spraying of non-ferrous metals has also made great strides. The necessary equipment is all being manufactured in the country and the possibilities of this method of protection, repair and conservation of metals are enormous not only from the non-ferrous point of view, but in connection with industry as a whole.

6. **Future**.—India's main problem is raw material and a review should be made of the import tariffs levied on these metals. The Indian Tariff Board appointed by Government is fully seized of the situation. It is considered that the tariff for ingot metal should be lower than the tariff imposed on semi-manufactures or process metals. Another point that needs investigation is the possibilities of a specified manufacture of non-ferrous metal, which can be made in India, being imported at a lower tariff rate than the raw material for which it could be made (an example can be cited—racks for withering tea can be made from aluminium in India. Before the war aluminium was imported on a tariff rate considerably higher than that demanded for the finished article thus giving unfair advantage to the overseas manufacturers). The industry must have free access to the raw materials required unhampered by tariff.

The next problem is lack of first class equipment and the practical technical knowledge to work the same. These problems can be overcome but the industry must be protected against outside competition. It must take all the necessary

steps to improve the quality of output and lower the prices and not stand idle shivering should a tariff and giving Indian consumers poor materials. Firms must not think in terms of big profits if they hope to hold the Indian market and a competitive selling price fixed by the Association must be the practice. In conjunction with the association or as a separate entity Technical Bodies should be set up sponsored by the industry. Their job would be to publish technical literature, watch developments overseas and report on their findings, assist individual firms in the metallurgical problems, etc.

A further step would be the installation of a Laboratory and Test House which would cater for the metal producers who have no facilities of their own. Reasonable charges would encourage the small man to improve his quality of output and raise himself above the level of a cottage industry.

Lastly during the war period one of the greatest handicaps has been the lack of trained metallurgical personnel. Many of the Universities admittedly give a sound theoretical training only. It is the practical metallurgist that India needs. Such training should be arranged abroad.

India's consumption of non-ferrous metals is small but with the rapid industrialisation it is bound to increase greatly. There will be great expansion in electrification, telephones, railways, ship-building, automobiles and aircraft industries, etc., all of which will result in greatly increased use of non-ferrous metals. The growing home market due to the increased demand for non-ferrous metals will enable the establishment of manufacturing and refining industry which can be developed to meet her own requirements of semi-finished manufactures.

As regards production of primary metals, India can be self-sufficient in aluminium, antimony and lead. The production of copper can also be expanded. As regards copper, zinc, lead and tin, India's resources require to be properly investigated. Active state policy of adequate protection and assistance for importing up-to-date plant and machinery, coupled with financial help in suitable cases, will be the corner-stone for the building of a large non-ferrous industry in this country.

The specific cases dealt with in the above paragraphs do not cover the full range of India's non-ferrous industry, but may give some idea of the possibilities of production in the post-war period. If all the various branches of the industry pool together on the lines suggested, there seems no reason why rapid strides should not be made. It may even be possible for India to capture a portion of the Far East market.

CHAPTER LIII

MICA

1. Introductory.—The shortage of mica was among the causes which contributed to Germany's ultimate defeat in the last war. In the absence of this valuable material, which is known as the world's finest insulator, the Germans were reduced to using oil-impregnated paper for insulation purposes in such high power machinery as Zeppelin Engines.

In this war Mica has played not only a much greater but also an indispensable part in the manufacture of the delicate precision machinery to which science has given a high place in modern warfare. India's 70 year old mica industry has produced the largest quantity of mica for the United Nations, and can claim a considerable share of credit for victory in Europe.

Mica is probably the only strategic mineral in respect of which the Allies are so very dependent upon India. The mineral owes its importance to its electrical properties and its capacity for splitting into the thinnest films known as "splittings". It has an important place in the manufacture of aeroplanes, submarines, tanks and wireless apparatus. Mica has specially valuable properties. It is transparent to light, but impervious to heat. Mica is regarded as indispensable in the making of electric condensers for radio transmitters and receivers and is largely used as distance pieces in radio valves. It is compact and does not absorb moisture, and its commercial price ranges from Rs. 5 per ton as scrap to Rs. 5,000 per maund for the best qualities. Modern high power motors, used for aeroplanes, have been made possible by spark plugs in which mica is used as the insulating medium. Modern transmission of power under enormous tension, exceeding even 250,000 volts, is possible only by the use of mica insulation in the transformers. Mica is particularly used as a dielectric in radio condensers, because of its low power factor and high dielectric constant. Pieces of mica are used to support and insulate from each other the filaments in radio tube receiving sets. The highest quality mica is reputed to be used as a filter in television.

From the above the indispensable part that mica plays in the manufacture of the delicate precision machinery to which science has given a high place in modern warfare can be clearly seen. In the autumn of 1943, a Far Eastern Survey, published by the American Council of the Institute of Pacific Relations expressed the view "that India is indispensable to the efforts of the United Nations, if only for the production of mica necessary for the maintenance of all electrical production, both civil and military."

2. Condition on the eve of the second World War.—Even during the first World War, efforts were made to increase mica production. In those days exports were about 50,000 cwts. but prices rose from Rs. 87 per cwt. in 1914-15 to Rs. 161 in 1918-19. Since 1919, the industry grew rapidly till in 1939 the output increased to about $2\frac{1}{2}$ times and was about 125,000 cwts. Mica was being exported to Japan, Italy and Germany before the war broke out. At the outbreak of war the industry was well established and the mineral was among the country's most important exports. However, the mining methods needed much to be desired. Thieving so detrimental to the industry was still rampant. Mines were, however, becoming increasingly modernised and production of micconite was in its infancy. The pre-war annual value of the exports was approximately Rs. 1 crore, the annual value during the last few years has been of the order of about Rs. $2\frac{1}{2}$ to 3 crores.

3. **Developments during Second World War.**—It is not perhaps generally realised that the greater proportion of the world's requirements of better quality sheet mica (perhaps over 80 per cent.) is supplied from Bihar. Sheets and films are the really important "munitions mica".

About December 1939, the position was that mica exports were restricted to the normal average imports to most neutral countries in Europe, and free shipment was permitted to the rest of the world. No account was taken of the various types of mica, and thus it was possible for much increased supplies of "munitions" mica to reach certain destinations.

From the 9th December 1939, the licensing of exports was fixed as follows:—

- (1) Free—only to the U.S.A., U.K., France, Portugal and Turkey.
- (2) Half normal average shipments to certain European neutrals.
- (3) Average to the rest of the world including Japan.

A scheme for the control of mica designed to ensure an adequate supply of "munitions" mica to His Majesty's Government and its allies was evolved. Drastic export restrictions were applied to safeguard the position. The immediate effect of the measures taken was to prevent the export of inordinately large quantities to Japan.

Steps had to be taken to secure adequate supplies for His Majesty's Government and to see that no supplies reached the enemy. With a view to achieve this end, an Order known as the Mica Control Order, 1940, was issued under rule 81(2) of the Defence of India Rules. The purpose of the order was to put an end, or at least to limit, the illicit extraction of and illicit dealing in mica.

A Mica Inspector was appointed and it was decided to have a main controlled area in Bihar to which the whole Order applied and an outer area comprising the rest of Bihar in which a much less stringent form of control would be in force.

Mica was divided into three categories: (1) Higher Grade Munitions Mica; (2) Lower Grade Munitions Mica; and (3) Non-Munitions Mica. Higher Grade Munitions Mica could be exported to the United Kingdom only; Lower Grade Munitions Mica and Non-Munitions Mica could be exported to Canada, the United States of America and Australia after being certified as such; while only duly certified non-ammunition mica could be exported to other countries. But no mica of any sort could be exported to European countries and Asiatic Russia.

The Supply Department became concerned with the supply of mica to the United States about August 1940. Before this, the mica required by the United States was bought through trade channels and the United Kingdom continued to use the trade channels up to May 1942. The first job the Supply Department did for the U.S.A. was to collect and pass on to them offers of mica for a "stock-pile" to be held in the United States. Trade buying went on concurrently, and the Supply Department was supposed to be taking only the surplus mica available in the market. The United States Government then asked the Department to enter into a contract with the Metal Reserve Company (an official body) for the supply of 5 million lbs. of splittings. This was followed up by a request for a further contract for the difference between 9 million lbs. of splittings and the quantity of splittings exported through trade channels during the twelve months ending September 1942. In addition there was a fairly important demand for block mica.

The mica commitments of the Supply Department were becoming so extensive that they suggested better results might be achieved if the British and American Governments got together and established a Purchasing Mission in

India with power to finalise contracts direct with the suppliers. Therefore a Joint Mica Mission composed of representatives of the British and U. S. Governments was established. They made purchases from miners and dealers. The Mission was the lynch-pin linking the remote and little known Bihar Mica-field (possessing in parts a strong resemblance to English park land) with the great armaments works of the Allies, in which the weapons of victory were forged.

It was decided that from the 1st August 1942, the Labour Department would take over from the Supply Department all functions connected with mica except the stock-pile transactions and the obligations of the Government of India under the contracts with the Metal Reserve Company.

The war created greatly increased demand for high grade mica and India has stepped up her production. The production which was 150,000 cwts in 1940 gradually rose to 180,000 cwts. per annum during war years. The Labour Department have been trying to place the industry on a sound and stable footing. A Mica Conference was held in April 1944 at which representatives of the Government of India, the Bihar Government, Trade Association and spokesmen of Mica Labour were present. The Government set up an Inquiry Committee to deal both with immediate and ultimate problems of the mica industry. The report is under consideration.

Owing to the sudden end of the war large stocks of mica got accumulated with the Joint Mica Mission, which became, from 1942, the sole purchaser of all Indian mica to be utilised by the United Nations. Unrestricted sale of this accumulated stock was sure to lead to paralysation of the Indian Mica Industry and to avert this discussions were carried on by representatives of Government of India with the U.K. for a regulated process of release without undue interference with current production in India.

Main commercial categories of clock and films, will be disposed of in the course of five years, while the disposal of smaller sizes of block mica of stained and lower quality will be spread over a ten year period. The initial rate of all quantities will be at the prevailing market price while world fluctuations in prices will be taken into account as and when necessary.

A Mica Disposals Panel has been formed in London with one representative each of the British Board of Trade, the Mica Trade Association and the Government of India as Members. The Indian representative will be assisted by two members representing the Indian mica trade.

4. Future (Post-war).—Destined to play such a vital strategic role in the world's biggest war, India's mica industry is also looking forward to a bright future.

It may be stated that although India has stepped up production during war-time, other countries too have been stepping up production and giving governmental assistance in encouraging industrialists to work deposits which would in normal times not be tapped. Important developments have taken place in Canada, the United States of America, Brazil, East Africa and Australia.

It is, therefore, important that the Indian Industry should step up production to the utmost to retain its hold on the world market and forestall the emergency of competitive industries which may "squeeze" it out of picture. Complacency in the matter will be absolutely fatal.

The mica industry in India is well established, and the mineral is amongst the country's most important exports. But possibilities should be explored for improving the industry by strict vigilance in certain cases over the methods of

mining, and of local disposal to prevent the serious thieving which is so detrimental to the industry and which may mean the difference between success and failure of a mine. The mines are becoming increasingly mechanised and the industry is one which now requires large capital investments and modern equipment for its successful operation. Costs require close attention. In the future, control of marketing may be necessary to reduce the effects of internal competition on prices, and the present established standards should be continued with necessary inspection of exports. In India, manufacture of various kinds of micanite is in its infancy but will undoubtedly expand, and with increased skill it is not improbable that a large proportion of the mica splittings may be converted into micanite locally. It must, however, be remembered that should the cost of various forms of mica be unduly increased in other countries, the latter may be forced to look around more energetically, for substitutes wherever these can be used, or foreign mica producers may be able to compete more successfully with India. Ground mica and micanite industries too could be established in the country.

The report of the Mica Enquiry Committee has since been published. This Committee was appointed to inquire into the many aspects of the industry including grading and marketing, conservation, research and utilization. It was called upon to report also on "the desirability of setting up a suitable machinery, whether by the appointment of a Central Mica Committee or otherwise, to watch the interests of mica trade and industry". The Committee has made many recommendations, main being :

- (1) systematic mining should be made compulsory in deep mines,
- (2) establishment of a separate Inspectorate of Mica Mines and the application of the Mines Act to all mica mines except shallow ones,
- (3) establishment of a Mica Marketing Control Board which, besides watching ordinary trade interests, should also conduct research and development.
- (4) proposal to levy 6 per cent ad valorem on all mica exports for financing the establishments and for research in the interests of the industry.
- (5) emphasis on utilization of mica in the country itself.

CHAPTER LIV

ENGINEERING INDUSTRIES

The engineering industry of India had its beginnings well over a hundred years ago. A few firms in the Presidency towns were engaged in making bridges and repairing engines, and with the introduction of railways, this kind of work expanded. Railway companies maintained their own workshops and these did valuable pioneering work in engineering and also served as training schools for technicians. Private firms were, however, needed for the construction of bridges and the fabrication of general steel structures. Wagon building was also left to private firms, and along with this went the repair and replacement of parts like buffers, axle boxes, vacuum brake fittings, etc. Thus the heavy engineering industry came into being in India and was mostly located in Calcutta, with large firms like Braithwaite & Co.; Burn & Co.; Jessop & Co., and others. Apart from undertaking structural work of all kinds, most of these firms made wagons and also did mechanical engineering works.

With the establishment of jute, cotton and sugar factories, mechanical engineering industry expanded and machinery like hydraulic presses began to be made in the country. Repairing work of a varied nature also arose. Early engineering firms were started mostly by British enterprise. Gradually Indian firms came in. In 1924, the Indian Engineering Association had 40 firms as members with a capital investment of Rs. 12 crores. This excluded the small firms scattered about the country. The total number of persons engaged in this industry in 1924 was estimated at 75,000.

With the establishment of Tata Iron and Steel Co., the external dependence on iron and steel goods gradually diminished. Rails, structurals, tin-plates, galvanised sheets, wire nails, etc., began to be produced in India. Lately, wheels, tyres and axles have also come to be made. Foundries have been started and castings in iron and steel are being made in increasing quantities.

The Indian Engineering industry has long been dependent on Government as its chief customer. Therefore, the Government's policy in regard to capital expenditure has had a great influence on it. After the last war a period of expansion followed, especially after 1925, but all this changed with the world economic crisis of 1929. The total consumption of structural steel in 1934 was hardly 50 per cent., of what it was in 1929 as the capital works-programmes were cut down and engineering industry fell on slack days. A cheese paring policy was followed in the matter of wagon building. Such was the condition of the engineering industry at the outbreak of the war.

In 1939, the Indian Engineering Association had 58 firms as members and the total number of employees was about 84,000. By 1943, the membership rose to 87 and the number of employees went up to 150,000. This Association is affiliated to the Bengal Chamber of Commerce. Another association "The Engineering Association of India" has also been started lately and has a membership of 45. Engineering Industry will be dealt with under Structural, Mechanical, Wagon building and armoured Vehicles, Automobile and Electrical Engineering.

STRUCTURAL ENGINEERING

This is an important specialised industry and requires large workshops and extensive mechanical equipment to carry it on. But unlike many other industries the work carried on is mostly of the jobbing variety. The volume of work also varies considerably from time to time. In peace-time, a great variety of

different kinds of structures were produced according to individual, industrial or other use, and roughly they came under the following heads:—

- (a) Railway and Road Bridges for Civil and Military purposes;
- (b) Steel-frame structures, *e.g.*, Workshops, Warehouses, steel frames for residential buildings, crane gantries;
- (c) Aeroplane Hangars of various designs and forms of construction;
- (d) Jetties;
- (e) Special plant supporting structures;
- (f) Transmission towers;
- (g) Oilwell derrik and tripool etc., etc.

From the beginning, structural industry was concentrated in and around Calcutta, and in the vicinity of the two big steel factories. The nearness of the port of Calcutta and the availability of iron ore, coal, limestone, etc., have been the principal factors leading to such a localisation.

It is believed that before the war only 50 per cent. of the capacity of India's Structural Industry was absorbed. The capacity increased in war-time to about 10,000 tons per month, but it was not possible to reach this output due to inadequate supplies of materials, transport, trained labour etc. The increased output required as a result of war demands was met by working on a more continuous basis, and in several cases night shifts were worked.

Some existing fabricating shops were able to obtain in the early years of the war certain items of machine-tools and these they installed to assist in balancing their output, but the amount of new machinery installed in fabricating shops since the beginning of the war did not make much difference to the production capacity.

In war-time, nearly the same articles as in peace-time were produced except that in many cases they were military versions of the type produced in peace-time. Floating docks were the only important category newly added. One great difference between normal and war-time work was that while the lines of production were numerous and varied before the war, the tendency in war-time were to concentrate on standardised unit structures on military lines. To this extent, mass production replaced jobbing. In war-time military needs had been chiefly for standardised store sheds and other structures generally of smaller size, but required in large numbers. Therefore unit construction huts, called by various names, were the largest line of structural work. They were all constructed in such a manner as to enable standardised production to be carried out (*e.g.*, T.G. Sheddings, single and twin Nissen Huttings, etc.). Large numbers of aeroplane hangars—and big ones too—were made on a standardised basis. In war, it also became necessary for structural firms to take a hand in marine engineering although it is not legitimately a part of this industry. Barges and floating docks were made. Three large floating docks were constructed and one of them is said to be the largest in the world. Ferry pontoons and D.T.N. Flats were also made. In pre-war days, about 60,000 tons of mild and high tensile steel, rivets and belts were annually used by the structural industry. During war, the consumption steadily increased and doubled by 1944. The bulk of the output went into defence requirements and into the essential key industries like iron and steel works, ports, etc. The total value of orders placed for fabricated steel work came to Rs. 345 and 600 lakhs in 1943 and 1944 respectively.

Prior to the outbreak of war, the structural industry had to struggle to keep establishments going owing to the paucity of demand. Owing to re-construction programme comprising road, rail and bridges etc., demands are likely to increase now. Whether the industry can compete with imports in the open market will

depend on the price of steel and the regulation about import of foreign steel manufactures into India. In any case, the industry is bound to play an important part in the industrialisation of the country.

MECHANICAL ENGINEERING INDUSTRY

The various industries engaged in making and repairing machines and other mechanical appliances have been grouped together in this chapter. Important firms engaged in mechanical engineering are Jessop & Co.; Burn & Co.; Garden Reach workshops, James Alexander & Co.; Jay Engineering Works (all at Calcutta); Richardson & Cruikshank, Bombay; Herman & Monatta, Karachi; Cooper Engineering Works, Satara; Kirloskar Brothers, Kirloskarwadi; Britannia Machinery Limited, Titagur; and P.S.G. & Sons, Coimbatore. It has not been possible to make a complete survey of the recent advances in all industries under this heading; moreover, many developments lie outside the scope of the Supply Department. Some developments under the following heads are given below:—

- (i) Pumps;
- (ii) Oil Engines;
- (iii) Water fittings;
- (iv) Weighing Machines and Jacks;
- (v) Road-making machinery and Road Rollers;
- (vi) Agricultural Implements; and
- (vii) Manufacturers' Machinery.

(i) **Pumps.**—Before the war centrifugal pumps were being manufactured by Kirloskar Brothers, P.S.G. & Sons and Jyoti Limited, Baroda. Demands for pumps increased during war time as a result of increased activity in regard to food production. The production of pumps was, however, restricted due to the limited supplies of cast iron and roller bearings. A large number of firms have been making hand pumps and India is self-supporting. In future, these major firms manufacturing centrifugal pumps may expand their production as a commercial measure. Expansion schemes are in hand.

(ii) **Oil Engines.**—Before the war Indian production of prime movers was negligible. Cooper Engineering Works, Satara, and Kirloskar Brothers were the only two firms engaged in this industry; the former manufactured a range of horizontal slowspeed engine, the latter vertical single and twin cylinder engines. Cooper Engineering Works were assisted and have expanded their production and introduced a new high speed horizontal type of engine. Kirloskar Brothers could not import essential components and had to stop production. At present (Dec. 1946), schemes are in hand for the expansion of Diesel Engine Manufacturing Industry.

(iii) **Water Fittings.**—Before the war India's requirements were met by imports. During war the Supply Department assisted the firms with large orders and controlled raw materials, and production of Water Fittings was developed. Important manufacturers are Indian Iron and Steel Company Limited, Messrs. Tatanagar Foundry Company Limited, and Messrs. Mysore Iron and Steel Company, Limited. The industry did not make much progress owing to lack of some key materials such as forged manganese bronze for spindles of sluice valves.

Production of smaller fittings, such as bib cock, globe valve etc., is on a sound footing and may continue but imports of superior quality are likely to dominate the Indian market in respect of other bigger items.

(iv) **Weighing Machines, Jacks, etc.**—Only a few firms were manufacturing weighing machines before the war. They expanded their production during

war-time by concentrating on important types. The important firms are at Calcutta, viz., Auto Scales Manufacturing Co., Calcutta; Avery & Co.; Indian Machinery Limited; Bharat Weighing Scales and Engineering Syndicate; Star Iron Works; and Jessop and Company. The production of jacks increased due to the very large demand for vehicles in war-time due to the fact that the vehicles which came under the L/L agreement had no jacks with them. In 1943, 15,000 jacks were produced, in 1944, the production rose to 50,000 jacks. Demand is gradually falling off.

(v) **Road-making machinery and Road Rollers.**—*Bitumen Boilers and Mixers.*—Bitumen boilers are vessels for heating bitumen or road tar prior to pouring on road surfaces. The boiler with a set of paddles inside to be turned by means of a handle by human labour is termed a 'bitumen mixer'. Before the war, Burn and Company, Calcutta, and Bhagat and Sons, Bombay, were manufacturing those items, the total production was about 100 only. As a result of increased demands for roads and aerodromes, several new firms such as B. N. Chatterjee & Co., Calcutta; James Alexander & Co., Calcutta; Herman & Mohatta, Karachi; Featherstone Engineering Company, Bombay; and Sayaji Iron Works, Baroda took this line of production. The production capacity is now 1,000 units per annum and the price too has gone down from Rs. 2,000 to Rs. 1,500 per unit. Demands are likely to increase owing to road development schemes and if need be, other engineering workshops can manufacture these items.

Asphalt Mixers and Concrete Mixers.—These are revolving drums driven by power (internal combustion engine) used for intimately mixing cement or asphalt with stone chips, the former for reinforced concrete and road construction and the latter for road or aerodrome surface construction. These mixers are generally mounted on wheels and can be towed about.

Before the war, only Millar's Timber and Trading Company, Bombay, were producing these mixers; during war, Herman & Mohatta, Karachi, and Cooper Connolly & Clifford, Bombay, developed production and the present capacity is sixty units per annum. Production processes call for extensive machinery and some of the processes are complicated. Practically all the machinery used had to be imported. Formerly the entire driving unit, i.e., the internal combustion engine, too was imported. The engines are now being made in India and can be adapted for use with mixers. As demands are likely to increase, Indian production will be easily absorbed.

Road Rollers.—The Government of India have under consideration a scheme for the manufacture of one thousand steam and 500 diesel road rollers of the British type by Indian Ordnance Factories and certain Indian firms in co-operation with manufacturers in the U.K., as a result of the recommendations of the Road Roller Mission which visited India early in 1946, and the negotiations carried on with representatives of British concerns. The entire scheme will cost about Rs. 4.4 crores, nearly 40 per cent, of which will be incurred in the Indian Ordnance factories and the rest in Indian and associated British concerns. Deliveries are expected to start early in 1947, for completion within two years. The terms agreed upon provide *inter alia* that jigs, patterns, drawings, designs and other technical information will be made available in the country and that such technical personnel and co-ordinating cells as may be required by the Ordnance factories and other firms concerned will be provided by the contracting British firms. The arrangements are that complete boiler and gear units in respect of steam-rollers and engines and gear units in respect of Diesel rollers will be imported from the U.K. and the rest manufactured in the Ordnance factories and by two Indian firms. Erection, Assembly, commissioning and servicing will be done entirely in India.

(vi) **Agricultural Implements.**—The manufacture of power-operated agricultural implements hitherto had not been undertaken in this country. In 1945,

the Government of India sent out their representatives to America to procure much-needed tractors and tractor-drawn implements for food production programmes of the provinces and the States. Government were able to secure approximately 450 Diesel track-type tractors in the United States and England. An equal number of tractors was obtained from American war surplus property in the India-Burma theatre. But the position regarding implements to work behind these tractors did not prove so simple. While they were able to obtain a certain number of ploughs, barrows etc., in England, Canada and the United States of America, the number procured was far behind the number necessary to render all these tractors productive and useful.

The firm of agricultural engineers, Messrs. Pashabhai Patel and Company, have undertaken to organise the manufacture of tractor-drawn ploughs, disc ploughs, disc harrows and cultivators; and supply them in time for useful work during 1947.

The Government of India has placed with this firm an order for 1,250 of these agricultural units, of which delivery will start from the middle of February, 1947. The Government has also agreed to lease to the firm the Poona Aircraft Factory which was built during the war years and which is equipped with the latest production machinery so as to enable them to start work immediately on this job, while a permanent factory is being built with a capital of one crore of rupees. The latter is expected to be completed within a year.

Tatas have agreed to supply the necessary varieties of steel for the manufacture.

(vii) **Manufacturers' Machinery.**—*Textile Machinery.*—India's big Textile Industry, of cotton, jute, silk and woollen uses considerable quantities of textile machinery. Imports amounted to Rs. 2½ crores per annum.

Lack of sufficient imports was a handicap to expansion and a company, Textile Machinery Corporation Limited, came into being. They set up two factories—one at Gwalior and the other at Belghuriah (Bengal). The production capacity is 2,000 looms and 1,00,000 spindles—about 20 per cent of the replacement requirements. The factories, however, could not carry out their programme owing to war conditions. They are producing only a few thousand looms annually. The machinery required is precision tools and automatic machines and is imported. For Spinning frames, ring frames, steel tubes, steel rods and polished tin sheets are required. They were imported but may now be supplied by the Indian Steel Industry. The industry is in its infancy and will need special help to stand competition from abroad.

Dairy Machinery.—This refers to such items as cream separators pasteurizers, milk coolers, milk bottling machines, etc. India is only producing 'Aluminium Vats' for milk coolers and receivers. This consists of sheet aluminium shaped into large vessels with copper or brass tubing across them for circulating cold water. Production does not require extensive machinery. Raw material, aluminium sheets and copper tubing, are obtainable locally. The only producer in India is Larsen and Toubro in Bombay. The items made here form the simplest parts of Dairy Equipment and may continue to be produced but they have little value without imported accessories.

General.—Steps are now being taken to start Heavy Engineering Industry to manufacture Industrial Machinery, Road Making Machinery and Boilers and also Motor Vehicle assembling and manufacturing Industry. Light Engineering industry for the manufacture of toys, electrodes, woodscrews and hurricane lanterns is also receiving attention. Schemes are already in hand for the expansion of Pumps Manufacturing Industry, Bicycle Industry and Sewing Machines Manufacturing Industry with a view to make India self-sufficient ultimately.

WAGON BUILDING AND ARMoured VEHICLES

General.—Of the many articles which the Indian engineering industry was called upon to manufacture in war time, wagons and armoured fighting vehicles stand out. Their manufacture involves both structural and mechanical processes.

(a) **Wagon Building.**—The building of Railway wagons in India is a long established industry. The Railway companies have their own equipment for repairing and reconditioning wagons, but they do not ordinarily construct new wagons. Four firms in India were making wagons, *viz.*, Jessop & Co. (Dum Dum) Bird & Co. (Howrah), the Indian Standard Wagon Co. (Burnpur) and Braithwaite & Co. (Kidderpore). Of these only the Indian Standard Wagon Co., specialised in wagon building, while the other firms dealt with it along with other engineering works. Their production on an average was between 2,500 and 3,000 wagons a year.

So long as imports continued unimpeded, no special difficulty was experienced in obtaining components from the U.K. but after the middle of 1941, importation became difficult, and the Supply Department looked to local industry for the various materials required for wagon-building. Materials required for the construction of wagons were (a) Steel materials (like structurals, plates, bars and billets, spring steels and rivets), (b) Steel castings and forgings and (c) Wheels and axles. The items mentioned at (a) above were made chiefly by the larger iron and steel producers. The chief problem under (a) was regarding rivets. These have always been in short supply and production had to be undertaken here from rolled steel bars. In 1943, Burn & Co., and Jessop & Co. began to make their own rivets. In spite of such advances, a large quantity of rivets had still to be imported. Steel castings were required for axle boxes, buffers, etc., and these were made by Kumardhubi Engineering Works, Bhartyia Electric Steel Co., Ballygunj, and Burn & Co., Howrah.

Wheels and axles were formerly all imported, but in war Tata succeeded in making them by laying out a new plant.

A programme for 10,000 wagons was made in the middle of 1942 to be completed by the middle of 1944. Of this only a small percentage could be delivered owing to the delay in the supply of wheels and axles. In spite of the active efforts of Government, and the India Supply Mission, imports could not be arranged in time. The production of wheels and axles is now being undertaken at the Tata Iron and Steel Works, Jamshedpur, but the supply so far has not been adequate. We had to depend partly on imports. The development of wagon building is of great importance not only from the point of view of the Railway but also of the iron and steel engineering industries.

(b) **Armoured Vehicles.**—On the outbreak of war, India had no facilities for the manufacture of armoured vehicles, which are an essential part in mechanised warfare. Measures were soon taken to develop this industry. The chassis for the vehicles had to be imported from abroad, but the body could be designed and manufactured locally. This necessitated the development of the manufacture of bullet-proof steel according to War Office specifications. The Tata Works at Jamshedpur succeeded in making bullet-proof plating which came up to the specifications required. As the quantities produced were not adequate, imports had to be arranged from America. The next problem was the fabrication of the bullet-proof steel. This entailed the imports of the oxyacetylene cutting plant. The remaining part of the manufacture of bodies, could be done by the engineering workshop in India.

The major portion of the armoured vehicle construction was undertaken at the East Indian Railway Workshops, Tatanagar, and to a lesser extent at the Bengal and Assam Railway Workshops, Kanchrapara, Indian Standard Wagon, Burnpur and the Port Commissioners Works, Calcutta. In addition to these

works, components such as pannier boxes, rifles brackets, clips, machine gun brackets clips, water tanks, hot food containers, sand mat brackets, equipment lockers, ammunitions boxes etc., were manufactured by about 150 to 200 minor contracting firms from time to time under contractual obligation. In addition to the manufacture of armoured vehicles, maintenance of spare parts and equipment for the maintenance of vehicles were also manufactured in India. The production of equipment e.g., foot pumps, lifting jacks, wheel alignment gauge, grease guns, oil squirts and lubricating equipment, for the maintenance of vehicles was also increased.

AUTOMOBILE INDUSTRY

The manufacture of automobiles occupies an important place among basic industries. The necessities of war-time make it even more basic in a special way, as transport is the essence of efficient war effort. Not only does this industry supply the necessary transport vehicles in war-time, it can also be readily converted for the manufacture of engines and other parts of aircraft. Certain essential requirements of munitions industries can also be produced in the automobile plant. This industry must, therefore, be assigned a high priority in any plans for industrial development. So far in India only a beginning has been made in regard to this vital industry, viz., building of bodies on imported chassis. Schemes for the assembly and ultimately the complete manufacture of automobiles and their spare parts are also being actively pursued. The recommendations of the Automobile and Tractor panel, constituted by Government in 1945 are under consideration.

Body-building and assembly of vehicles.—Before the war, the body-building industry in India was rather undeveloped, and the number of chassis assembled never exceeded 15,000. The Ford Motor Company and General Motors at Bombay used to import their commercial vehicles into India in 'completely knocked down' condition and assembled the chassis in their plants in Bombay. Ford Company had assembly plants in Calcutta and Madras also. In September 1939, Messrs. General Motors installed plant and machinery in their Bombay works for the construction of various types of commercial bodies.

Six months before the outbreak of hostilities in 1939 the General Motors (India) Ltd. also inaugurated a new enterprise known as "Commercial Body Building Corporation." The spread of the war into the Middle East, converting India into a main supply base for operations, accelerated the Government of India's mechanisation programme. It fell to the lot of this organisation to become the chief source for the supply of army trucks. As a result of a comprehensive programme of expansion in production in 1940, a period of vigorous activity was ushered in. With the increased army orders and yet uninterrupted supplies from America, the expansion programme waxed. In 1940, the production of army bodies and chassis totalled 4,809 and 10,160 units respectively; while in 1941, they numbered 15,796 and 26,208. In 1942, this Corporation produced 16,781 bodies of army cars of various designs and 26,317 chassis. In 1943, the production increased to 36,438 chassis and 23,000 bodies. The output in 1944 was still greater. The General Motors also acted as liaison between the factories in the U.S.A. and the Army Ordnance Depots with regard to the receipt of L/L vehicles and parts, and brought specialised personnel from all parts of the world and also assumed responsibility for taking deliveries of all spare parts received in India from the General Motors factories.

The Ford Company has, on the other hand, concentrated itself on the production of more complicated type of vehicles and supplied 39 different types. This wide variety includes such special vehicles as:—mobile workshops, armoured car chassis with engines in the rear, wreck recovery vehicles fitted with cranes, aircraft refuelling tankers, aerodrome flood lighting units, R.A.F. crash tenders with fire fighting equipment, R.A.F. 8 ton tractor and trailer units, boat and

bridge carriers; portable circular saw units powered by V-8 engines, etc. Workshop facilities were greatly increased, additional equipment of all kinds was installed and labour force too was increased manifold. The number of employees increased from 700 to 4,000 and the output of vehicles increased 700 per cent. The Company has, further, assembled quantities of other makes including Dodge, Studebaker, G.M.C., Diamond T, and Mack as well as heavy trailers for transporting tanks. Before the war, the Ford Company had assembly plants at Bombay, Calcutta, Madras and Co'ombo. In all of them operations were greatly expanded, and in 1941, a fifth assembly plant was put into operation in Bombay.

Since the war started, till December 1945, 333,768 vehicles had been delivered to the Defence Services.

The supply of the four essentials for army body-building viz., steel, timber, canvas and hardware (nuts, bolts, screws, etc.) came under Government control in 1941. With the exception of certain items of hardware like bolts, nuts, wood screws, and machine screws, all other items are available in India. The expansion of the industry has meant increased employment and about 5,000 workers with a pay roll of about 40 lakhs are employed by the industry with the additional usual complement of supervisory and clerical staff.

Automobile Manufacture.—Though India is not able to boast of a wholly indigenous motor car industry, steps have been taken in this direction lately by the starting of two organisations, viz., The Premier Automobiles Ltd., in Bombay and the Hindustan Motors Ltd., Baroda, to foster the industry. It is understood that the former have entered into an agreement with the Chrysler Corporation of Detroit, U.S.A., and the latter with Nuffields, a premier British firm, for initial help towards the manufacture of automobiles in India.

ELECTRICAL ENGINEERING INDUSTRY

India's limited supplies of coal and oil make the development of electric power a matter of great importance not only because it is a cheap motive power for industries, but also because electricity is an essential requisite for raising the standard of living of the people. The use of electricity as a motive power for industries is bound to increase considerably in future. Increasing use of electricity will be required for transport purposes, especially the electrification of railways and the extended use of trams. The use of electricity for heating, lighting, and cooling (by means of fans, refrigerators and air conditioning apparatus) is also daily increasing. The potential reserves are estimated at about 27 million kilowatts of which hardly half a million have been developed so far. With the larger utilisation of electricity, the demand for the various accessories of electrical engineering will greatly increase and their manufacture in India may become necessary.

Before World War II, India was producing some of the important electrical goods like incandescent electrical lamps, electric fans, etc., but Indian production could meet only a small portion of the internal demand. Imports came chiefly from the U.K. (50 per cent. in the case of the lamps, 60 per cent. of the fans and 90 per cent. of the secondary batteries). Germany came next in the list followed by Netherlands, Italy and France. Imports from Japan were meagre except in the case of vacuum lamps, 70 per cent. of which came from that country.

War brought an opportunity for the expansion of these industries and for the production of new items. The following are the most important electrical accessories whose production has been newly started in India as a result of the war:—

- (1) Black Adhesive tapes.
- (2) Conduit Pipes.
- (3) 'D' class signalling cables.

The production of the following articles has received a great fillip:—

- (1) Electric Fans.
- (2) Incandescent electric lamps.
- (3) Accessories for electric lighting.
- (4) Dry batteries and cells.
- (5) Secondary batteries.
- (6) Distribution transformers.
- (7) Electric wires and cables.
- (8) Electric Motors.

The production of all these articles except electric fans and incandescent electric lamps was on a very small scale before the war, and the expansion of their production has been considerable, especially in the case of electric wires and cables, electric motors, etc.

The components and raw materials for these industries had to come from abroad before the war, excepting for some of the minor items like bare copper wire and cable, red lead, antimony etc. The position did not improve much in war-time, though efforts were made to find substitutes for many of the component parts; mild steel sheets in the place of aluminium for fan blades, plain bearings in the place of ball bearings etc. But such indigenous materials cannot be depended upon for production for a competitive market, where good quality and low costs are the deciding factors.

1. *Incandescent Electric lamps for general light services.*—

	Nos.
Pre-war production	5,500,000
Pre-war consumption	14,000,000
Present capacity	15,000,000

Expansion in the lamp manufacturing industry has been achieved by arrival of plant and machinery ordered before the war by the manufacturers in their attempt to increase production. A statutory control was exercised by Government as a war-time measure over all the manufacturers and they could only produce electric lamps and sell under Government direction.

2. *Electric Fan Industry (domestic type).*—

	Nos.
Pre-war capacity	40,000
Pre-war consumption	120,000
Present capacity	150,000

Expansion was mainly achieved by setting up new factories and increasing capacity of old firms. There are at present as many as 60 to 70 firms all over the country.

3. *Dry Cells.*—

	Cells
Pre-war capacity	15,000,000
Present production	150,000,000

Expansion of the industry was achieved by bringing under the statutory control two firms i.e., National Carbon Co. (India) Ltd., Calcutta, and Estrelas Batteries, Bombay. The firms were assisted by Government in importing materials from the U.S.A. under Lease/Lend and from the U.K. and acquiring local materials most of which were controlled.

4. Storage Battery.—

	Nos.
Pre-war capacity	36,000
Present production	122,000

Two new factories were set up, viz., Standard Batteries Ltd., Bombay and Chloride Electrical Storage Co. Ltd., Calcutta, and they are the main producers of this store.

5. Power Transformers.—

Power Transformers here cover up to and including 500 KVA and 22,000 volts on the H.T. side—and small L.T. Transformers up to 25-KVA:—

	KVA aggregate
Pre-war capacity	6,000
Present capacity	78,000

Capacity of the only factory before the war was doubled. In addition to this, two new factories were started.

6. Electric Motors.—(A.C. 3 phase, drip-proof, squirrel cage upto 30 H.P.).—

	H. P.
Pre-war capacity	9,000
Present capacity	60,900

Expansion was achieved by starting new factories and stepping up production of the already existing ones.

7. Electrical Cable and Wire.—It can be divided into three main categories:—

(a) Rubber insulated cable—

	Million yds.
Pre-war capacity	20
Present capacity	50

(b) Bare copper wire—

	Tons
Pre-war capacity	2,400
Present capacity	7,200

(c) Cotton and Silk winding wires—

	Tons
Pre-war capacity	200
Present capacity	300

Expansion has been mainly due to the setting up of an entirely new firm, namely, National Insulated Cable Co. of India Ltd. Another important development was the setting up of a factory at Tatanagar near the Indian Cable Company's factory for the manufacture of 'D' Class Signalling Cables solely required by the army. The Indian Cable Company was under the statutory control of Government during war and was prohibited from selling or otherwise disposing of any insulated wire and cable except under a written authorisation.

Electrolytic Black Copper Rod—

	Tons per annum
Pre-war capacity	Nil
Present capacity	18,000 to 24,000

Expansion was mainly due to the setting up of a new factory, viz., National Rolling Mills Ltd..

G. Black Adhesive Tapes—

	Tons
Pre-war capacity	Nil
Present production	40

The curtailment of imports encouraged the establishment of this industry and now two firms—Rajgarhia Brothers and Commercial Bureau—are producing tapes. Government assisted the industry by getting the raw materials released. It is estimated that the present production namely 40 tons a year will be sufficient to meet India's peace-time demand in full. The position of this industry as a key industry in the sense that black adhesive tape is absolutely essential for the use of electricity calls for steps to prevent its extinction in the post-war period.

Future.—Although the Indian production of electrical goods has expanded considerably in war-time, the present output is insufficient to meet our demands in full. Hence the need for imports in the case of most of the articles. Dependence on imported raw materials and component parts was one of the causes for the slow progress of the industry in war-time and the position is not likely to change unless technical progress in India forges ahead. Though the manufacture of most of the articles calls for skill of a specialised kind, Indian manufacturers have been able to train the local labourer. In the matter of quality, the Indian products generally have not reached the standard of imports except in a few cases like fans and lamps. Indian manufacturers may have to face the severe competition of cheap imports of better quality goods from abroad. Scientific research can do a great deal in improving the quality of the electrical goods. It may also be possible to start the production of various other electrical articles—instruments and equipment including air-conditioning plants and refrigerators—and expand industries like motors, transformers and electric appliances, switch gears and electric torches.

CHAPTER LV

WELDING AND PRESS WORK

By press work is meant the process of giving a desired shape to an object, e.g., manufacturing the bodies of motor cars, tin boxes, etc. Welding is the process of fusing two metallic bodies into one homogenous block.

Press work in India especially in regard to light and medium pressings was well-established before the war, but heavy pressings as, for example, those required to make motor car bodies, had not been taken up. Heavy pressings called 'hot pressings' have been taken up in war-time and much progress has also been made in light medium pressings. War demands have led to the growth of pressing work as a cottage industry, especially in the Punjab.

Welding industry embraces not only electric arc welding, but gas welding, flame cutting, flame hardening, furnace brazing, resistance, spot, flash and butt welding and many other processes. This industry played a tremendous part in the production of the Liberty and Victory Ships built in America and in the construction of Aeroplanes, Rolling stock, Transport Vehicles etc. In India, welding industry was in its infancy, still it helped in the production of armaments, guns, ship construction and a host of other war stores.

Under Press work and welding the important articles are (1) Petrol cans and oil containers; (2) Containers including Food cans; (3) Lanterns and lamps; (4) Electrodes and Carbide and their war-time developments are given below.

1. Petrol Cans and Oil Containers.—These include petrol cans (two gallons), kerosene oil tins (4 gallons and 1 gallon); drums for lubricating oil, mineral oil, vegetable oil, bigger containers like 10 gallon drums, 20 gallon drums, 42 gallon casks, and small cans for food products.

Before the war, containers were manufactured by Burmah Shell at their installations at Calcutta, Bombay, Marmagao, Madras, Ernakulam, Coconada and Karachi and by the Assam Oil Company at Digboi, by the Attock Oil Company at Rawalpindi, by the Standard Vacuum Oil Company at Calcutta, Bombay, Coconada, Marmagao, Ernakulam and Karachi. The total monthly output came to about 257,300 one-gallon tins, 72,400 two-gallon tins and 2,648,000 four-gallon tins.

Facilities for the manufacture of drums and barrels were more limited and only one firm—Indian Galvanising (1926) Limited, Howrah, was making barrels and Barry & Co., Naihati, were making four-gallon drums.

Several oil companies re-conditioned their plants to meet the increasing demands for containers created by the war. They concentrated on the production of 44 gallon Barrels, 4 I. Gallon Drums and 2 gallon Cans.

- During war the swift movement of the military called for the use of suitable containers of all sorts. This abnormal demand is gradually going down. Kerosene oil tins, especially one gallon size and drums for paints and vegetable oils, however, continue to be in good demand. Even then the industry has to shrink.

2. Other containers including Food-cans.—Before the war the Metal Box Company of India was producing open top cans for canned food and general Line Cans for all other products packed in tins. The Company has three factories—two general Line Factories, one at Calcutta, and one at Bombay and one open top can factory at Okara.

In war-time the Company expanded their production to cover cannisters, stampings, military equipment, aircraft parts and munitions components.

pressed out and fabricated from light metals. Many millions of tin plate and blackplate containers have been produced for the packing of evaporated milk, pasteurised butter, cheese, margarine, paints, oils, etc. The Company has also produced millions of units of webbing equipment and millions of 'composite' containers consisting of a specially wound cardboard body, glued and waxed with metal ends. They also manufactured collapsible tubes on a large scale.

In peace-time, the main raw material used was the tin plate, and its consumption amounted to between 2,500 and 3,000 tons annually. In war-time, PCRCA (picked, cold, rolled, closed and annealed) blackplate and terneplate were also used besides mild steel, m.s. wire, pure tin, lead, brass and aluminium.

This industry has a good future. Demands for food cans are bound to increase as fruit preservation is being developed. Demand for other containers will also go up with the general industrialisation.

3. Lanterns and Lamps.—Before the war, hurricane lanterns were imported from America. About 1930 India-made lanterns, namely Prabhakar and Dipti came into the market, but the bulk of the civilian demand continued to be met by cheap imported lanterns. Imports came to about 45-50 lakhs per annum.

During the war demands increased and attempts were made to develop new sources. The Bihar Lantern Factory, Dumraon, came into being. Defence requirements were met from Oriental Metal Industries, Ogale Glass Works, and Bihar Lantern Factory. In peace-time lanterns were manufactured from tin plate or black sheet re-tinned. Since 1942 they have been manufactured from terneplate and P.C.R.C.A. black plates.

The industry may survive if they modernise and reduce the cost of production. As it is, their selling price is high. The industry applied for protection. The Tariff Board recommended that the existing 30 per cent. revenue duty on hurricane lanterns should be converted into a 30 per cent. ad valorem protective duty. The Government of India have decided to levy the protective duty up to March 31, 1949. Facilities for the import of the machinery required by the industry will also be granted. The present (January 1947) rated capacity of the country is 17.5 lakhs per annum, but a new company with an annual productive capacity of 6,00,000 hopes to go into production within a year.

Pressure Oil Lamps.—Before the war, Petromax lamps used to come from Germany. During war, indigenous production has been developed and several firms have come into being and are manufacturing Lanterns Hurricane and incandescent—100, 200, 300 candle power Lamps Incandescent hanging—400 candle power. Indigenous capacity is still short of our requirements and the industry has a good chance of survival.

4. Electrodes.—Electrodes are pieces of steel wire coated with flux which on burning becomes slag and are used for electric welding.

Before the war about 500 tons of electrodes were imported annually. During war the requirements increased to 2,000 tons. Indigenous production was developed and several firms such as Indian Electrode Manufacturing Company, Calcutta; National Radio Engineering Company, Bombay; Western India Company, Jodhpur; Australian Welding Company, Lahore; etc., came into being. Their output is sufficient to meet the peace-time demand and the industry has a good chance of survival.

CHAPTER LVI

SHIPBUILDING AND SHIP REPAIRS

(a) SHIPBUILDING

General.—Shipbuilding comprises three main operations, viz., (1) construction of the hull; (2) making and fitting of the boilers and machinery; and (2) electrical installations, etc. Engineering in one form or another enters into the various processes connected with shipbuilding. Shipbuilding and ship repairs are intimately inter-connected and are generally done by the same firms.

A ship is a complex structure and ship construction a combination of art and science with much preparatory work to be undertaken. It is divided into several phases. Firstly comes the design, on which depends the efficiency of the vessel from the owner's viewpoint. To obtain maximum efficiency with economy, combination of the following qualities has to be incorporated in the finished vessels, viz., type, size, form, speed and seaworthiness. Consequent upon these rest the power and type of propelling machinery, suitable means for loading and discharging of cargo, arrangement and housing of ships' personnel, and the necessary arrangements for the vessel's navigation, operation of life-saving appliances and other problems such as cooking, refrigeration of provisions, lighting, etc. Thus shipbuilding calls for many differing skilled tradesmen, including carpenters, boiler makers, welders, shipwrights, fitters, turners, machinists, blacksmiths, coppersmiths, electricians, pipe fitters, riggers, sheet metal workers, and painters.

Pre-war.—Ships have been built in India from time immemorial, but the position changed materially when wooden sailing vessels were replaced by steel-made steam driven ships as a result of the epoch-making improvement in marine construction technique about the nineteenth century. In East India Company's days, fine sailing ships were built in India especially on the west coast, with the teak of the Western Ghats. During the first World War, the transport requirements of the overseas forces in the East and the need for sea-going tonnage gave a great impetus to the shipbuilding industry. The demand for water transport became heavy and arrangements were made for the construction of a large number of rivercraft and for the re-erection of craft of various kinds sent out from England in plates and angles. A large shipyard was laid down at Karachi.

After the first World War, the development of shipbuilding industry aroused considerable interest. India has a coast-line of about 4,000 miles with 7,000,000 tons of coastal trade and 25,000,000 tons of overseas trade at pre-war levels. The annual value of this overseas import and export trade alone came to about Rs. 400 crores. Considerable improvement was effected and inland water steamers from 20 ft. to 300 ft. long, harbour launches, motor launches and dumb craft for transporting cargo to and from ships were built in large numbers. In the years immediately before the second World War, some advance was made in the construction of larger vessels also. Sea-going tugs up to 440 tons were built at Calcutta. The Scindia Steam Navigation Co., laid out a large shipyard at Vizagapatam for the construction of steamers up to 8,000 tons (dead weight). Most of the machinery required—Punching, Beam-bending and Angle Shearing machinery, Pneumatic and other machine tools—had been obtained from the United Kingdom but further progress was delayed by the war taking a serious turn.

War-time developments.—When the War broke out, the position of the industry briefly was that with the exception of the few established firms in Calcutta, Bombay and Karachi, India knew little of shipbuilding to a laid down

specification, Admiralty or Commercial. Owing to the deterioration of the war situation in early 1940, the case had to be reviewed, observing that the U.K. capacity was fully absorbed and long sea communications were becoming day by day more precarious. A meeting was held in Simla at which the limitations of existing established shipbuilding firms in India were indicated. Admiralty requested capacity for mine-sweeping and escort vessels and undertook to supply main propelling machinery together with auxiliaries, boilers, electrical equipment, etc., provided India undertook hull construction and completion. India accepted the commitment initially of 10 Basset Class A/S-M/S trawlers, 2 Bangor Class Minesweepers and 4 L/L Motor Minesweepers. The Basset and Bangor type vessels were placed with established firms in Calcutta and Bombay and the Motor Minesweepers allocated to Cochin in South India. A Shipbuilding Directorate was established under the D.G.M.P. to deal with this programme. In 1941, additional building programme was accepted in the shape of Fairmile "B" Type Patrol Boats and "Z"-Craft (L.C.T.). Commitments were then 65 vessels of all types. The main hold up in that year was due to the fact of heavy losses *en route* of admiralty supply items of main and auxiliary machinery owing to enemy action. Other difficulties chiefly in regard to the supply of steel materials, producers not being able to keep to delivery dates, etc., were encountered.

The position further deteriorated on the declaration of War by Japan and it became obvious that local improvisation would have to be carried out as far as practicable. At this time triple expansion steam main propelling machinery for the programme in hand was in production for the first time in the history of India. As already stated steps were taken in mid-1942 to co-ordinate and control all shipbuilding, Merchant and Naval ship repairs under the ægis of the Directorate General of Shipbuilding and Repairs. At this period a total of 20 firms came within the control of the Shipbuilding Directorate with a total commitment of 450 crafts. The threat to the East Coast by Japan early in 1943 necessitated a complete change of policy and meant that West Coast ports had to be investigated with a view to expansion for building craft of which they had no previous knowledge. East Coast firms were having a difficult time due to labour attendances falling off owing to enemy action and the disruption of supplies of raw material, etc., necessitated by military needs. The priority need at that period was for lighterage tonnage to enable ships initially booked for East India Coast ports to be discharged in the already strained alongside berths of stream at Bombay.

Wooden barge building to this date had never been to a laid down specification. Surveys were undertaken and new building centres opened in Kathiawar, Kutch, Bombay and Ratnagiri on the West Coast. This involved long journeys by train and in some instances special chartered planes touching down at unheard of landing grounds. Some trouble in respect of delivery of timber was caused. Difficulty in regard to fastenings was also overcome. Cheese headed bolts, spike nails, etc. were produced locally. In spite of these difficulties over 35,000 dead-weight tons of lighterage was completed and delivered in 1943.

In early 1943, heavy demands began to arrive from Naval and Army sources for all types of small craft, powered and dumb. So capacity expansion schemes were carried out with Messrs. Ahmadi Shipyard, Art Floorings and Shaparia Iron and Steel Works. Mass production on an organised basis was aimed at for the two first named firms and its success could be judged from the fact that mid "43 to V-J Day, a combined total of 762 Service craft ranging from Dinghies to 42" powered launches, L. C. A.'s and L. C. M.'s had been delivered.

Changed war conditions in the second half of 1943 necessitated a reversal of the policy of the transfer of building and plant from the East to the West. Heavy plants were again transferred and expansion schemes taken up where they were left off early in the year. At the close of the year total deliveries to all Services were 410 of all types.

In 1944, demands increased and new types of craft necessary to the offensive operations then in the early stages were laid down. Cargo and Water Barges capable of being lifted and carried forward by cargo ships, light craft power launches, river-paddle steamers, tugs, Landing Craft, Coastal Forces Craft and Floating Docks were in production. The material supply position was still acute and local improvisation had to be expanded particularly in regard to small launch marine engines. Salvaged car type petrol engines were converted and installed in lieu of the standard diesels with moderate results. Total deliveries at the end of the year were 1199 of all types.

Early 1945 brought increased demands with no improvement in the material transport position. Landing and assault craft were priority followed by support and consolidation craft. On V-J Day, 40 firms had a total commitment of 2778 craft as compared with 5 firms with a total commitment of 16 crafts in 1940 and 30th November 1945 3970 crafts of all types had been constructed.

(b) SHIP-REPAIR

Pre-war.—The Commercial Ship Repair industry in India in peace catered for inter-voyage repairs of ocean-going tonnage and for ships plying solely in Indian waters and consisted of about 15 repair firms. Port Trusts at the ports possessed workshops. Bombay and Calcutta had dry docks capable of taking large ships and there were smaller docks at Karachi, Cochin, Vizagapatam. Repairs to Naval ships of the R.I.N. were undertaken at H.M.I. Dockyard, Bombay, which had two dry docks, one of which could take "Dido" and "Arthusa" class cruisers and the other all classes of destroyers.

War-time developments.—In early part of the war, these resources were not unduly strained but during the latter part of 1941, the Dockyard and the Commercial Firms at short notice were called upon to cope with a great increase in work due to ships operating in the North African area being diverted to India for repairs and by the beginning of 1942, with ships from the Pacific where repair facilities had been captured by the enemy. Moreover, India had to shoulder part of the repair work that the U.K. yard could no longer undertake. The main sources of supply of materials to India were the U.K. and U.S.A. distant respectively 6,000 and 9,000 miles. So ships arriving after such long passages in all weathers were usually in need of running repairs. These requirements called for a large increase in facilities for ship repairs and also a complete control of those facilities throughout the entire range of berthage, workshop capacity, materials and labour so that the best could be obtained from the available resources. A Director of Merchant Ship Repairs, was appointed in 1942 to co-ordinate the repair of all warships and merchant ships in India. Later, the Directorate General of Shipbuilding and Ship Repairs was established in May 1942.

For both naval and merchant ship repairs, it was natural that the West Coast should be developed first. Bombay contained the only Naval Dockyard in India and was the major port for the import of war stores from the West; also, the advance of Japan to the Eastern frontiers of India caused Calcutta, Madras and Vizagapatam to decrease in importance. The first step taken to increase the workshop capacity on the West Coast was by transferring machinery from Calcutta, where there was a labour shortage due to Japanese air attacks, to Bombay, though a part was eventually sent to Karachi. Whilst this was in progress, planning to increase the largest workshop in Bombay by 50 per cent was undertaken and an entirely new workshop was transferred from Vizagapatam to Bombay. Small engineering firms at these West Coast ports were encouraged to undertake shiprepair and the erection of new shops in Karachi and Cochin was begun. Later as the Japanese threat diminished, East Coast capacity was increased by the installation of workshop balancing plant and by developing Vizagapatam into a naval-cum-private yard, which was particularly useful for small craft. The capacity expanded as above had, in addition to the

naval and merchant ship repair load, to meet demands for shipbuilding, degaussing, conversions and D.E.M.S. work including the fitting of plastic armour. In the early days, the British Fleet based on India was relatively small and the ordinary maintenance was within the capacity available. As the fleet increased it became evident that the amount of work which could be done per ship must decrease and it was decided to limit the repairs done in India to that essential to keep the ships running. This involved carrying out boiler cleaning, periodic dockings, minor damage repairs and ordinary maintenance; refits on a large scale would have to be done outside India and any vessels sustaining major damage would merely receive first aid treatment and be sent off the station for permanent repairs. The strength of the fleet which it was planned to maintain on the above basis in India was roughly as follows:—2 Fleet Carriers, 10 Cruisers, 9 Escort Carriers, 18 Destroyers, 7 Submarines, 94 Minesweepers, and 120 Escort vessels.

The largest ships dealt with during the war were the 2 Fleet carriers "Victorious" and "Indomitable" both of which were dry docked in Hughes Dock, Bombay. Among the major works undertaken in India can be included:—

- (1) Rebuilding the complete after end of the destroyer "Kimberley".
- (2) Large structural repairs and installation of new machinery in Netlayer "Protector".
- (3) Complete refit of submarine "Rover" after damage sustained by bombing and fire at Singapore.
- (4) Fore and damage repair in sloop "Geraldton".

Some idea of the result of the above activities throughout the war is given below:—

Men of all types and nationalities repaired (January 1944 to August 1945).	1,857
Merchant vessels of all types and nationalities repaired (January 1943 to August 1945).	7,261

(c) GENERAL

One of the earliest problems faced by the Department was the expansion and development of the shipbuilding and repair capacity of India to meet the vastly increased load. The foundations on which this expansion had to be based comprised the R.I.N. Dockyard, Bombay and 55 Commercial Firms. About 30 schemes were carried out. These schemes were put forward in agreement with the firms and while, in some cases, the firms agreed to pay for the whole cost and Government had only to provide official support, in others the firms met a portion of the expense only and assistance had to be provided to them by Government. The important schemes were: Mazagon Dock; Repair Southward First Expansion; Second Expansion; Moghul Dock; Repair Ship "Hilda"; Hughes Dock Crane; H.M.I. Dockyard Bombay; Scinda Steam Navigation Co. Bombay; Cochin Harbour Works; Range Finder Shop and Gunmounting Shop, Bombay; India Central Navigation and Railway Co. Calcutta, etc. The above schemes cost about Rs. 1½ crores.

The question of skilled labour was a serious problem from the very beginning. The Technical Training Scheme proved inadequate and a special training scheme was devised. Some Chinese labour and Italian prisoners of war were recruited. Apart from the specific difficulties experienced by the two branches of the industry, the common difficulties were (a) firms had never done work to the standard demanded by Admiralty specifications; (b) competent supervisory staff was lacking in the firms; (c) nor was the Directorate

General of Shipbuilding and Shiprepairs having a suitable inspecting staff; (4) slowness of delivery of locally ordered components and the poor standard of workmanship and in many cases large discrepancies from the dimensions given on drawings caused great inconvenience.

Post-war prospects.—The truly global war has demonstrated the paramount value of shipping to the Allied cause and it will prove of equal importance to our peace-time way of life. Despite the amazing development of aerial transport services, upon ships of many types and tonnages devolved the task of moving men and munitions, the maintenance of supplies, communications and the transporting and conveying of precious cargoes of life-sustaining foodstuffs. Ships of many types and tonnages are now required in the transport of food and materials for the rehabilitation of war-devastated areas, resumption of international trade and the resurgence of tourist travelling. The shipbuilding industry should, therefore, enjoy a busy post-war period. India's steadily expanding overseas trade and her position in the Asia of the future, must to a great extent depend upon her maritime resources.

The success of the shipbuilding industry in India depends on the size of the Indian mercantile marine as well as on the policy of construction of naval vessels, crafts for use in ports and harbours, fishing trawlers, etc. in India. It is also essential to reserve the coastal trade entirely to Indian vessels. Indian shipping will also have to participate actively in the overseas trade of the country. A well-developed shipbuilding industry in India could also execute orders for ports and inland waterways of Burma as well as for ancillary industries in Malaya, Ceylon and other territories in South East Asia since there is no large shipbuilding yard in existence except in Hong Kong.

In our shipbuilding industry-mushroomed into being by the demands of war—we have an asset of great possibilities. India is undoubtedly now equipped for building smaller vessels, though building of the larger vessels is still a difficult problem. If recent advances in Indian metallurgical industry are maintained, it may be possible to manufacture in India several of the components required for building large ships—structurals, plates and castings. But this involves the establishment of several ancillary industries. During war successful attempts were made to utilise the capacity in the steel production centres and railway works to produce lead plates, cylinders, crank-shafts, pistons, windlasses etc. Technical skill must also make large strides. All this will take time. The pace of progress can, however, be quickened, if work on a carefully devised plan is undertaken. The Government of India have already constituted a Shipping Policy Committee and a Shipbuilding Industry Panel, for making a preliminary survey and suitable recommendations for the development of the shipbuilding industry in India.

CHAPTER LVII

AIRCRAFT

It was the war of 1914-18 which provided the impetus towards bringing aviation into common use as a means of transportation. Under the hothouse forcing conditions imposed by war, increased knowledge was acquired on numerous matters concerning aerodynamics, aircraft designs and aero-engines. The interregnum between the two world wars brought aircraft into world-wide commercial use for there was no civil aviation before then. The impact of the second world war stressed the designing and building of aircraft and engines having special military significance which were later re-designed and developed for private and commercial work. Thus Aeronautical Engineering is a comparatively recent development even in Western countries, and war has been a very dominant factor in this development.

Producing an aircraft is comparable to assembling a gigantic jigsaw puzzle parts of which would come in different sizes from every corner of the country. Building an aircraft involves such other factors as engineering and planing, factory buildings and labour, machine tools and equipment. Procurement problems of the aircraft industry are innumerable. Communications material, wheels, bolts and nuts have also to be brought together at the same place, at the right time.

Even the overhaul and repair of an aircraft is not an easy job. In take-off and landing operations, an aircraft is subjected to terrific punishment which is often sufficient to damage it. In flight, it suffers a great deal of wear and tear. Planes must, therefore, be overhauled regularly by trained experts, a task which is almost equivalent to building a new aircraft, since the machine brought in for re-conditioning must be literally torn to pieces and re-constructed from nose to tail.

Before the war, India was ill-equipped even for the repair of aircraft and its manufacture was, therefore, a far cry. The entry of Japan into the war and early collapse of Malaya and Burma turned the Eastern Provinces of India into a War theatre and caused an immediate expansion of the Air Forces all over India. Squadrons were forced to operate from temporary aerodromes with no maintenance facilities. The Repair Depot at Karachi was too small to accept the large repair load which immediately arose and too far away from the scene of operations. Last but not the least the importation of spares and equipment was affected by the priority given to the other theatres of war and by enemy action on the long line of communications.

The first step in the repair and maintenance of aircraft was made by the Hindustan Aircraft Limited, Bangalore, which was established with a capital of Rs. 10 lakhs contributed equally by Walehand Hirachand Group, the originators of the scheme and the Mysore Government. Subsequently the Government of India also became one of the partners of the Company by contributing Rs. 25 lakhs to the share capital which was raised to Rs. 75 lakhs, the other two partners contributing Rs. 5 lakhs each extra. This company established an aircraft factory at Bangalore in 1940, which began as an assembly plant manufacturing planes from imported parts. In 1941, the factory turned out its first aeroplane. Subsequently the manufacturing programme of the factory was given up in order to give absolute priority to servicing, repair and overhaul of all American purchased aircraft, aero-engines and aircraft equipment used in India. The work was done by Indian craftsmen who were trained either at the factory or in the Civil Aviation Technical Training Schools in

India. The factory became the major repair depot of the Tenth U.S. Army Air Forces. It also served a portion of the American aircraft held by the R.A.F.

For the repair maintenance and overhaul of British and Indian aircraft operating in India and for the manufacture of Air-frame and engine spares modification sets and general equipment, 16 Civil Maintenance Units (CMU's) were opened in different stations under the D.G.A. In most instances the buildings were constructed or erected and all equipment, plant machine tools, etc., were provided by Government. The Units were managed by Railway Authorities, by Civilian Firms under special contracts or by Civilians. Supervision and technical advice was provided mainly by R.A.F. specialist officers. The most successful units initially were those formed in the neighbourhood and under the management of existing workshops mainly because they were able to obtain trained labour force more easily. Eventually, however, the independent units such as those under Tata Aircraft Limited reached a higher standard of efficiency. The manufacturing C.M.U.'s were slow to start production but this was due to the time taken to obtain all the machine tools and plant from the U.K. and U.S.A. RED's were set up in each circle to act as a sort of clearing house, to which units in the area despatched all unserviceable items. Each circle had a C.R.O. (M.T.) and a Bonded Store containing R.A.F.M.T. spares.

Efforts made to manufacture aircraft equipment and parts in India were handicapped by the delay in getting machine tools from abroad and the shortage of technical staff. Moreover, the productive capacity of the country was already fully engaged for other Defence purposes. Nevertheless, during 1943 alone, 13,270 different items covering many thousands of large and small parts were manufactured in the various factories in India for the use of the R.A.F. A large number of small spare parts both for the airframes and aero-engines was also manufactured for the use of the C.R.O. This work was done by the Civil Maintenance Units and the civilian firms controlled through the six regional centres, namely, Madras, Bombay, Lahore, Calcutta, Cawnpore and Karachi. Spare parts, A.G.S. items, ground equipment, engine test benches, workshop tools and plant and equipment of all descriptions were manufactured to the high standard set by the Aeronautical Inspection Depots. The range of items was limited by the type of materials available in India; it could have been extended considerably if special steels and materials which could not be produced in India had been made available. Considerable assistance was given by the Ordnance Factories and three of them were equipped with modern machine tools and plant and were in full production by the end of 1944. They manufactured Base Tool Kits and Flight Tool Kits, which cover 652 items, involving the production of about 12,000 tools. Tool kits were also made by other armament factories in India on a smaller scale. Considerable progress was also made in the manufacture of aircraft jettison tanks. In 1944, 10,000 aluminium and 5,000 Plywood Hurricane tanks and 3,000 Spitfire tanks were completed. By the end of 1944, 10,000 Thunderbolt tanks of larger capacity were produced. Experimental tanks of a new form of construction developed by Indian scientists were successfully made. A large programme of fitting special vehicles with W/T and Radar equipment in locally designed and constructed bodies was also completed by the end of 1944. The erection of new aircraft was undertaken by the Tata Aircraft. Its output in 1944 averaged 70 aircraft per mensem.

The aircraft industry is thus entirely a war-time development. Such sudden growths necessarily lack stability. The future of the aircraft industry in this country is dependent on the development of a market internally. Today the Indian market is not enough to support a larger aircraft industry. Air transport, however, is bound to become more popular in this vast sub-continent of long distances. There is every necessity to build up the industry,

but it has to be done by stages. The Indian aircraft industry will for long have to depend mostly on the internal market, as the overseas markets are likely to be supplied by the full developed aircraft industry of the United Kingdom and the United States of America. Even in the internal market, the quality of the aircraft will be the deciding factor, as the aviation services will have to pay special attention to efficiency and security of services.

Recently an Aircraft Mission from the United Kingdom visited this country and surveyed the possibility of an aircraft industry in India. According to the Report of the Mission, India can have a self-supporting aircraft industry by 1965 capable of exporting planes to important countries within the Indian sphere of influence. The Mission has suggested a ten-point plan to provide India with a modern industry at a cost of Rs. 130 lakhs in the first five years. The ten points are:—

- (1) The Hindustan Aircraft factory at Bangalore should be selected as the first factory;
- (2) Directors should be appointed immediately;
- (3) Action should be initiated to obtain new executive;
- (4) A time-limit of six months should be imposed for re-staffing;
- (5) First instalments of the balancing plant should be ordered;
- (6) An order book should be built up;
- (7) All possible pressure should be exercised to secure orders for rail coaches as a subsidiary;
- (8) Government should be prepared to place a pre-production order for 20 training aircraft, which would absorb labour for 12 months;
- (9) Government should be prepared to take similar action with regard to advanced trainers in 12 months' time with a larger pre-production order if possible;
- (10) Starting of an apprentice scheme as soon as the factory is stabilised.

The recommendations of the Mission have been accepted and steps are being taken to re-constitute H.A.L. on the lines indicated by the Mission. With effect from the 1st April 1946, the Mysore Government who were only a sleeping partner during the War have become active partner with the result that H.A.L. is now a civil factory—with two thirds of the capital contributed by the Government of India and one third by the Mysore Government.

CHAPTER LVIII

WOOLLEN MANUFACTURES

1. **Introductory.**—Only lighter wollen coverings are required for the short-lived winter season in the greater part of India. India produced some very fine and artistic woollen fabrics till the last quarter of the 19th century. The woollen industry in India is essentially of a local character and both the distribution of the industry and the types of products produced by it have been largely determined by geographical factors. The best Indian wools are produced in Bikaner, the adjoining country of the Punjab, Cutch and Western India. A superior quality wool is produced in parts of the Mysore State. The fineness of the fabrics of Kashmir is mainly due to the excellent quality of the raw material available in the State. On the other hand, in Bombay, Madras, Central Provinces, Bihar and parts of the U. P. and the Punjab, the wool produced is of a coarse blanket called the 'kambli'. The industry is concentrated in the U.P., the Punjab and Kashmir as the areas are favourably situated for the import of "frontier wool" from Afghanistan and Tibet and to some extent from Persia and Iraq. The locational factors apply to mills as well as to handlooms. The first woollen mills to be set up in India were Cawnpore and Dhariwal Woollen Mills followed by mills in Amritsar.

2. **Importance of wool in war.**—Scientifically wool has a physical structure of its own and is the only crimp fibre produced by nature. It protects the sheep against the rigours of heat, cold and dampness, and no other natural or synthetic fibre possesses in any comparable way its insulating properties. Wool possesses properties that artificial imitation cannot reproduce and, therefore, no adequate substitute has been discovered. Where a fabric is required to be durable, health protective, attractive in appearance and kind to the touch, wool stands alone. Wool is particularly valuable for its heat insulation properties. As the Germans found in their winter campaign in Russia, nothing would approach wool for protection from the chilling effects of cold and wet. Wool also possesses qualities of elasticity which are particularly valuable.

It was the first World War which convinced the world of the inherent qualities which make wool a virtual necessity to the human race. Uniforms having a large percentage of substitute fibres gave their wearers reduced protection and were eventually regarded as having largely contributed to the wide-spread epidemics of pneumonia and influenza that occurred in the training camps of America during the severe winter of 1917-18. In this war too, wool has again played a vital part in assisting Allied efforts towards victory. During this global conflict, the lack of this essential virgin product has been a serious handicap for Axis combat forces. When Stalingrad was finally reconquered by the Soviet Russian Armies, large numbers of German prisoners were found to be verging on a state of almost physical collapse. The Russians discovered, too, that countless thousands of Nazis who had been engaged in the Eastern European campaign had succumbed to disease as a result of the unaccustomed severity of winter conditions there, and the main cause was considered to be insufficient warmth of their clothing outfits which were made largely from cold and artificial textiles.

3. **Woollen Mills Industry.**—During the first World War, India had five woollen mills and their entire output was taken by the Indian Munitions Board. The total supply of woollen and worsted manufactures in India was, however, insufficient to meet the full requirements and imports were necessary. The yearly supplies made in India totalled nearly 60,00,000 yards of

woollen and worsted cloth; 5,000,000 items of hosiery such as socks, jerseys, mittens, etc.; 1,250,000 pairs of woollen putties, etc. After the war, the number of mills gradually rose to 15. The major units of the industry are at Cawnpore, Dhariwal (Punjab) and Bombay. Lesser units are located at Bangalore, Amritsar, Srinagar, Baroda and Mirzapur. During the period 1936 to 1939 indigenous production was about four million pounds excluding hand-spun and hand-woven goods and was not adequate for India's requirements. So about 1.2 million pounds of woollen goods were imported.

The major units of the industry were making cheaper grades of worsted suitings, hosiery, lohis, union cloth (woollen and cotton), woollen tweeds, broad cloth, flannel and rugs.

In 1934, a Tariff Board enquired into the conditions of this industry and suggested imposition of duties on woollen blankets and protective duties against shoddy materials from Italy, cheap goods from Japan and on hosiery. These measures gave a fillip to the industry. The condition, however, when the war broke out in 1939 was far from healthy. Several units of the industry which had sprung up immediately after the end of the First World War had been forced to cease working or had gone into liquidation while those which were still carrying on were doing so under difficult conditions, and, most of them, on very restricted schedules due to the severe almost insensible competition from Japan, which flooded the Indian markets with yarns and piece-goods at cheap prices.

During the period between the two wars, the Army authorities introduced many changes in the standards which tended towards the provision of finer qualities, with the result that in 1939, there were few standard items required by the Army which could be made from wools produced in India and adjacent countries, known as "East Indian wools". Thus practically all the requirements of the Army except soldier's blankets were made from imported wools.

One of the first actions of the British Government in 1939, was to purchase for the duration of the war and one year thereafter, the whole clip of the three largest wool producing members of the British Commonwealth, viz., Australia, New Zealand and South Africa. This, of course, immediately affected the mills in India which had been accustomed to import from Australia.

In September 1939 the Government of India called a meeting of representatives of all working mills to discuss the position. The mills agreed to place at the disposal of Government the whole of their manufacturing capacity for the production of goods required for the Armed Forces, and Government undertook to obtain release from His Majesty's Government of those wools grown overseas which were required for the production of goods required for the Armed forces. To enlist the co-operation of the industry, Government appointed Mr. Watt as Adviser on Woollen Industry on the 1st October, 1939. He was to scrutinise all offers for raw wools and to advise Government as to the type and qualities of East Indian wools necessary for the Indian Woollen Industry. He also began to scrutinise mill demands for supplies of Australian and New Zealand wool tops and recommended priority, etc. In short he exercised a general scrutiny of indents and advised Government on schemes of expansion and also regarding the costing of woollen mills.

During the war, the mills worked three shifts a day. The total annual war-time production of all the organised woollen mills has been 15 million lbs. nearly four times what it was before the war. There was greater standardisation in the manufacture of goods for the Defence Services. Capital was advanced by Government for the purchase of raw materials. Two new mills for producing blankets were started in 1943 at Allahabad and Bangalore.

Orders on organised industry during 1943 came to about Rs. 760 lakhs, and during 1944 to about Rs. 602 lakhs. Basic prices were fixed on the basis of

actual cost of production during January/June 1941. The following are some of the important articles supplied during 1943 and 1944:—

	1943	1944
	Yds.	Yds.
Serge Service Dress	2,575,070	1,971,500
Shirting Angola Drab	3,564,000	1,624,350
Cloth Drab Mixtur	1,362,660	..
Flannel Silver Grey	2,600,530	70,000
Heavy Union Flannel	7,200,000	2,039,000

From 1939 to 1943 the organised industry worked entirely for Government. In 1944 the general public were experiencing an almost complete dearth of all woollen goods and it was decided that a proportion of the available manufacturing capacity of the industry should be set free from Army demand to meet, in part at least, the enormous civil demands. During 1945, as a result of the Hydari Mission diversions, it was decided that out of the total capacity of 27 million lbs., 16 million lbs. only would be supplied to the Defence Services and the rest would go to the civil market.

There are now about 26 woollen mills in India. During war years, the woollen mill industry like other industries was handicapped by inadequate supplies of coal or unsatisfactory quality of coal. This resulted in curtailment of production in several cases.

Future.—Indigenous goods could not compete with imported lines as the latter were never an all-wool affair, whereas the Indian industry prided itself in producing pure wool stuff from all-virgin wool.

Enormous quantities of waste left over during war can be utilised and woollen goods produced which can easily compete with imported lines. It is not possible to improve the existing location of industry. However, any new worsted mills can be located at or near ports. Large quantities of Australian wool would be available in the post-war period. The industry has necessary technical personnel and labour but rationalization is necessary.

4. Woollen (worsted) Power-loom Industry.—The distinction between worsteds and woollens is not commonly understood and some description of the process is necessary. The line of demarcation begins with the selection of the wools. In the worsted trade only wools with fibres of sufficient length to be combed can be used. In the manufacture of woollen yarns the shortest of fibres can be made use of, and consequently the use of 'recovered' wool (wool fibres obtained by the breaking up of rags and commonly known as shoddy and mungo), cotton and wastes for blending with virgin wool, is confined to the woollen side of the industry.

Some powerloom establishments have come to operate in the woollen manufacture also. Most of them are at Amritsar, where there are about forty concerns operating power-looms, about 850 in number. Prior to the war, these power-looms were using imported worsted yarn. Using such yarn in conjunction with cotton yarns, they produced shirtings, light weight suitings, shawl cloth, serges, etc. for the civil market. From 1939 upto the middle of 1942, these weavers had to remain idle for want of imported yarn. Government then arranged yarn for them against specific fabrication contracts.

5. Woollen Handloom Industry.—The woollen handloom industry formerly supplied a great deal of ordinary cloth in Northern India, but gradually mill-made fabrics ousted the handloom cloth. Competition of fabrics from abroad also hit this industry very much with the result that the hand-weavers had to confine themselves to blankets or specialities such as Kashmir Pashminas, shawls and U.P. carpets. Another section of the hand-weaving industry confined itself to the making of carpets and dorees which is also an old established industry, the principal centres being Mirzapore, Amritsar, Srinagar, Bangalore and Allore. Besides, carpets, rugs, blankets, etc., other articles such as puttoo, malida, alwan, socks, etc., are produced by the hand-weavers in the Punjab, Peshawar and the United Provinces.

During war, the Army's demand for barrack blankets was enormous and far in excess of the Mill's productive capacity. Handloom industry was, therefore, encouraged to produce blankets. In 1940, a scheme for developing the hand-loom industry was devised by the Supply Department in consultation with Provinces and States. By 1941, the production increased to about a million blankets per annum but the quality deteriorated. The inspection insisted on a superior standard which resulted in a fall in the output of blankets. The production therefore gradually decreased and as demands too fell, the production during 1945 was only 50,000.

Other handloom woollens.—Considerable quantities of hand-woven cloth have been purchased by the Supply Department from Kashmir State since the outbreak of war, mostly puttoo and tweed. The cottage industry is mainly located in the Kulu Valley, Kashmir, Almora and Panipat, where handloom weavers make blankets, puttoo cloth and woollen khaddar.

6. Woollen Hosiery and Knitting Industry.—(a) *Pre-war.*—The hosiery industry is essentially an off-shoot of the manufacture of cotton hosiery and dates from 1928. Owing to the higher profits obtainable in woollen manufacture, several hosiery factories changed over to wool and new factories were established particularly in the Punjab, exclusively for the manufacture of woollen. There are now important woollen hosiery factories in Bombay, Bengal, United Provinces and the Punjab. The industry is also being carried on extensive scale in the form of hand-knitting, especially in Bengal. The largest output of hosiery comes from the Punjab, where the growth of the industry was greatly helped by the import of cheap marine yarn of fine quality from Japan and elsewhere. In 1939 there were about 75 power and 264 non-power hosiery factories manufacturing woollen hosiery.

(b) *In war time.*—The woollen knitting industry has been employed by the Supply Department for the production of socks, stockings, jerseys, pull-overs, vests and drawers; all from woollen yarns provided by Government. In 1941, there were only 10 concerns. Gradually many other concerns were included in the Supply Department's scheme, till the number of such concerns reached 42. The monthly production capacity as its peak was; Socks and stockings 1,000,000 pairs; Jerseys 225,00 garments; vests 100,000 garments and Drawers 100,000 garments. The value of yarn used came to Rs. 300 lakhs in 1943 and 285 lakhs in 1944. Ludhiana is the largest centre of this industry.

(c) *After the war.*—Many of the knitting machines have been adjusted to meet the war requirements. The knitting equipment is simple and can easily be adjusted to meet the civilian requirements. They can continue their production if they obtain adequate supplies of yarn and needles. For both yarn and needles, the industry is mostly dependent on outside sources.

Government imported needles for industries engaged in the production of Defence requirements and since the production of knitting needles is a highly technical and complicated business, it is likely that the industry will continue to be dependent on supplies from abroad.

7. **Post-war (General) considerations.**—For considering the position of the industry in the post-war period, we must first know how the Indian industry fared in the pre-war period and what type and quantity of woollen goods were imported into the country. Imports increased from 1935 onwards and were at a peak in 1937-38. The weight of the piece goods imported averaged eight ounces to a yard. There was a considerable demand for certain types of light weight cloth, cheap but soft blankets and rugs of the type made on the continent.

Worsted & knitting yarns and woollen & worsted piece goods were mainly supplied by Japan, only about 25 per cent. being supplied by the U.K. while blankets and rugs were mostly supplied by Italy.

In the post-war economy efforts should be made for:—

- (1) Introduction of sections of woollen blending and spinning on the continental model. About 50 large cards and about 18,000 spindles of these types should serve a very useful purpose.
- (2) Re-organising and complete re-conditioning of the present woollen plants in India. Much plant has been seriously and continuously over-worked for a period of years and will have to be replaced at the earliest possible moment.
- (3) The import into the country of about 40,000 worsted spindles (and preparatory machinery) and about 700 looms for the production of worsted piece goods and piece goods with mixtures of wool and other fibres.
- (4) A centrally situated modern type of workshop should be established to manufacture spare parts and accessories which the mills have to import from abroad. The present machinery of the woollen mills is based on an economy which was suitable 30—40 years back. During war, the machinery has been heavily worked and strained. The mills should go in for complete re-conditioning and modernising of their plants. Technicians will also have to be trained and some experienced persons may have to be imported from abroad.
- (5) It will be necessary to assist existing mills to get from abroad required parts for re-conditioning and modernising and also to get certain units for additions. Some machinery from outside sterling area such as preparatory and spinning machinery from the continent and worsted clothlooms from U.S.A. and some finishing units from Europe and America may also be required. More complicated machinery such as multiple box looms will be a necessity for peace-time whereas for army goods the same looms may have operated on one or two boxes.

War has shown that the woollen industry can be classified as a key industry. Its drawback is that it has to depend on imports for a certain type of raw material. To make it independent of these imports, it is necessary to make experiment for the improvement of wools and induce flock-owners to adopt systematic and scientific methods of rearing.

The problems facing the woollen industry are so numerous that for a unity of purpose and so as to get all the mills to work up to suitable economic and desired standards of efficiency it would be advisable to organise various mills in India into certain groups. Two such groups already exist, viz., the Federation of Woollen Manufacturers in India and the Textile Manufacturers' Association of Amritsar. Such organisations can keep abreast of times and help

in maintenance of good standard of efficiency. Generally speaking, the post-war planning should aim at (1) making the country self-sufficient so far as the needs of the country are concerned; (2) reducing costs of production so as to enable a great *per capita* consumption; if the industry is re-organised it may be possible to reduce costs; and (3) regulating production so as to put as little strain on the transport system as possible.

The bulk of the woollens imported from continent are made from soft but short staple wool and from opened rags, shodies, etc. This line has not been followed by the Indian mills and suitable rags and wastes can be used after proper sorting and grading.

In future years it may not be possible to go in for hand-spinning on as large a scale as has been previously done. However, it would be necessary to provide the spinners with suitable machinery for opening, mixing and dyeing of wools on a co-operative basis so as to make their task easier and their products more standardised. The hand-loom weavers can be helped with supply of suitable yarns, establishment of institutions for dyeing and finishing and also for marketing.

CHAPTER LIX

JUTE

Jute has been grown in Bengal from time immemorial and the fibre was used for the making of twine, ropes, matting and even clothing for the poorer people. The first recorded instance of jute fibre having gone out of India is the despatch of a sample by the Board of Trade in Bengal in 1791. The first export of raw jute to Europe started in 1728, but though the production and export increased gradually, it was during the Crimean and American Civil Wars, the first of which shut off Russian flax and hemp, and the latter American cotton, that jute began to be used on a really large scale. The average area under jute from 1895-96 to 1899-1900 was two million acres and the average yield of jute 5.8 million bales of 400 pounds each.

With the success of the Dundee Jute Industry, the Indian hand-loom industry began to decline, but the most decisive blow to the handloom industry was given by the establishment of the jute mills in India. The modern Indian Jute Industry is essentially a development of the last 120 years, i.e., since 1828. Several companies came into being between 1854 and 1884. The Jute Mills Association was founded in 1884. Between 1896 and 1900, nineteen more mills were started. Periods of prosperity were followed by rapid increases in the number of mills. The number of looms which was 192 in 1859 rose to 68,700 in 1939.

The jute mill industry is highly concentrated in the areas North and South of Calcutta extending for roughly 30 miles in each direction, most of the mills being located on the banks of the Hooghly. The main cause of this localisation is to be sought in the facilities of transportation afforded by the river Hooghly in handling a bulky raw material and its manufactures.

The over-running of Russia by Germany in 1915-16 cut off the supply of flax to the Allies and shortage of this fibre for the manufacture of huge quantities of tents, cloth, tarpaulins, wagons covers, ground sheets, water buckets, etc., soon began to be felt. The canvas difficulty was most serious and recourse was had to jute. Jute canvas was, therefore, a war development. Moreover, there also arose a great demand for jute manufacturers in the shape of sand bags, canvas, corn sacks, etc., for war purposes for which the Calcutta mills had become practically the only important manufacturing agency.

Industry during the period between the two world wars (1918 to 1939).—At the end of the first world war, the trade somewhat slackened but with the rehabilitation of Europe and with the revival of industrial activity, the trade conditions improved and expanded. The rapid expansion of the industry continued. Exports gradually increased and while in 1887-1892 (quinquennial average) they amounted to 509,700 tons valued at 74,056 thousands of rupees, in 1938-39, the figure rose to 690,400 tons valued at 133,967 thousands of rupees. Great Britain was the largest overseas customer, taking about 25 per cent. of the total exports of raw jute, Germany, United States of America and France coming next.

In early days the industry only produced heavy sackings and coarse hessian and could not compete with Dundee which was producing finer cloth but gradually the export trade of manufactured goods also developed. While in 1887-1892 (quinquennial average), it amounted to 24,288 thousands of rupees, in 1938-39, it rose to 262,197 thousands of rupees.

Industry when the second world war broke out.—The growers of jute were hard hit by the depression—more hard hit than the jute mills. It appears that

as producers and consumers for raw material, the cultivator and the mills had an irresolvable conflict of interest. The demand for the restriction of jute acreage met with a very lukewarm reception at the hands of the mills. When it was clear to the Bengal Government that voluntary regulation of the crop was not likely to achieve any success, the Jute Regulation Act of 1940 was passed which empowered Government to limit the crop by the grant of licences to growers, the extent of area allowed for jute cultivation being determined as a proportion of the basic year, i.e., 1940. The basic area is 53,99,285 acres. The jute mills did try to cure the state of over-production by restriction of output but the result was that foreign mills increased their output. The Association also took drastic steps by sealing looms from time to time and restricting working hours and also entered into agreements with some of the important non-association mills. The position, however, did not improve. The Association approached Government with a proposal for increase in the export duty on raw jute, a reduction of duty on manufactured goods and a statutory restriction of working hours to 54 week but the proposals were not accepted.

When the war broke out, the industry has concluded with all its members a working Jute Agreement designed to correct the evils flowing from over-production, competition and depression.

Jute Industry during the second world war.—The outbreak of the European War in 1939 brought about considerable changes in the fortunes of Indian Jute Industry. War affected the position of the industry in a variety of ways, e.g., in the prices of manufactured goods and raw material, quality and quantity of production, stocks exports, profits, working hours etc. A great fluctuation started in the price of jute and jute manufactures due to huge orders of sand-bags, difficulty in shipping, increase of stocks, reduced demand from overseas countries, forecast of crops of raw jute, curtailment of working hours, promulgation of Ordinances for the control of prices, excess Profits Tax etc., etc. Within a few months the parity between price of raw material and manufactured goods was seriously disturbed and the industry did not have any spell of prosperity. The fall among other things was also due to over-production.

Due to the great catastrophe in the market as a result of unprecedentedly rapid and unexpected fall in the price of jute manufactures and raw jute, and with a view to avoid the hardships of cultivators, the Bengal Government promulgated an Ordinance in May 1940, fixing the minimum and maximum prices for raw jute, and bessians in the future markets. While this announcement and the prospect of compulsory restriction of next year's crop had the immediate effect of preventing the fall in prices for manufactured goods, this improvement could not be sustained and there was a great drop in prices. The sole effect, therefore of the Ordinance was to prevent all business in the future markets. Prior to and in the early stages of the war, the industry received large orders for sand bags for defence purposes which to some extent offset the falling off in current demands due to transport difficulties and the closure of European markets. Manchuria, China, Indo-China and Thailand were formerly amongst India's biggest customers for sacking. These markets disappeared after Japan entered the war. The greater continental Europe was closed to trade and the industry received substantial orders from the United Nations, but the loss of overseas markets, effective price control, high taxation, rising cost of production were the factors militating against high profits. The mills had to curtail production owing to lack of transport also.

The Government of India decided to utilise the Industry's own organisation for purposes of liaison with it and appointed the Chairman of the Indian Jute Mills' Association as Adviser on Jute Supplies. Government orders on the industry during war years came to about 15 to 17 crores per annum and absorbed about 20—22 per cent. of the total production. Orders were planned by the Adviser on individual mills.

Problems during war-time and how the industry faced them.—The problems confronting the jute industry have been somewhat peculiar; for, although it began to expand production as soon as the war broke out, owing to large orders of sandbags, the debacle of France, and, later on, the Japanese aggression in the Far East brought about a gradually shrinking market. The flare-up on the eastern borders of India and the proximity of Calcutta to the fighting zone created a number of other problems for this industry, of which not the least important has been the requisitioning of mills.

(a) *Coal supplies to Jute Industry.*—Instead of accepting any compulsory cut in jute production, the Indian Jute Mills Association volunteered to effect economies in the consumption and transport of coal by (a) cutting down domestic use of coal in mills and mill areas to extent of 45,000 tons per annum (b) accepting deliveries from a Central Coal Dump. A Dump for supplying coal to the Jute Mills in the Calcutta area was established at Bhadreswar and a second Dump at Fort Gloster from 1st April 1944. The operation of the Dumps resulted in 30 per cent. saving in coal transport for the jute mills. In October 1943, a Coal Rationing Scheme was drawn up under which quotas were fixed for each industry on the basis of its essentiality, actual supplies during the twelve months' period August 1942 to July 1943—and the total amount of coal that could be raised and delivered. The basic ration fixed for the jute industry amounted to 56,940 tons against the monthly average of 47,108 tons supplied to the mills during the period August 1942 to July 1943.

(b) *Requisitioning of Jute Mills space.*—In 1943, the Defence Services requisitioned a few jute mills without the intervention of the Supply Department. Supply Department being responsible for the procurement of jute goods and also for securing the maximum production necessary to meet the requirements of the United Nations were, therefore, confronted with the problem of making adequate storage space available to the Defence authorities while maintaining the existing level of production. A scheme was therefore, evolved the salient features of which were concentration of production in a reduced number of factories, adjustment of profits between the units released and the units where production was concentrated and while Government did not assume any financial liability for any loss arising out of concentration of production, they were responsible for seeing that the necessary measure of concentration was achieved.

Accordingly the Indian Jute Mills Association was requested to evolve a voluntary scheme bearing in mind the effect on Labour and considerations of economy in fuel and transport. A detailed scheme known as Walker Plan was put up by the Association. It was accepted that, high over-riding military considerations apart, the number of working units to be closed should not exceed 25 per cent. of the total loomage strength of mills in the Association's membership in Bengal. The total space given for vital war purposes amounted to about 7½ million square feet of covered pucca built accommodation with additionally well over 11 million square feet of open land.

An agreement was drawn up between the Supply Department and the Indian Jute Mills Association giving details of how the mills would be taken possession of and how they would be returned to the owners. Government agreed to pay a sum of Rs. 3 per hundred square feet per month as nominal rental for all pucca covered accommodation excluding houses.

In order to facilitate the question of compensation to non-working units, the Indian Jute Mills Association established a "MILLS INDUSTRIAL POOL" into which requisitioned mills were asked to pay all the amounts received from Government as rentals and all other mills a cess of Annas 2 per loom-hour actually worked during any given month. Disbursements were made to the mills that could not work their full permissible working hours. These payments were not made for less than one complete week's closure, but were made

against (i) the amount the closed mills paid-out to its workers for any such week at the rate of Rs. 5 per person per week and (ii) an amount equivalent to the loss sustained by the mills in issuing rations at subsidised rates to its workers. In addition, a further payment each month of a certain sum per loom-hour lost to those mills qualifying for payments under (i) and (ii) stated above was contemplated.

Since the war ended, steps have been taken to release the mills and already a considerable space has been decontrolled.

Achievements of the industry in other fields (New Developments During War).—In recent years, the industry has paid special attention towards specialities and Indian Mills are now turning out canvas, linoleum hessian, webbing, felting etc. Important developments are the production of a union canvas made of cotton warp and jute weft, rot-proofed bags, khaki webbing, besides haversacks belts, ammunition pouches, a line of two or three inch wide hessian strips, dyed to colours specified by the Defence Department, for camouflage purposes, pull-through cords for cleaning rifles, anti-blast fabrics, special twine for harness and saddlery factories, fabricated water-proof stores and, of course, hessian cloth and sacking bags for packing foodstuffs and other goods. In addition, the jute industry ran a Munitions Supply Section which, as its name suggests, was engaged on the production of munitions as distinct from textile stores. By the end of 1941, one hundred and seventy six machines of various descriptions and sizes were given for Government work. A plan was devised for making the fullest use of the machinery still left in mill workshops. A scheme for providing a "feeder" service of munitions parts relying entirely on the personnel and resources of the industry itself was devised. The remaining workshops concentrated on the manufacture of base plates and transit plugs for shells, wheel nave assemblies, and pipe boxes for gun carriages, cast iron weights for defence usages and component parts for armoured vehicles.

Post-war.—The jute industry is one of the biggest industries of the country and ranks next to the cotton textile industry in respect of the number of workers employed.

In 1921, there were 31 jute mills with 286,941 workers in the whole of India. By 1939, the number of jute mills rose to 108 and that of workers to 302,285. In 1921, the foremost province was Bengal with 281.8 thousand workers. By 1939, however, some jute mills had sprung up in the U. P. and Bihar. However, Bengal continues to be real home of the jute industry, with 93 per cent. of the total number of workers employed in that province.

Among the factors responsible for this concentration of the industry in Bengal must be mentioned the nearness of raw materials, the availability of power resources and the special advantages of Calcutta in respect of transport facilities. The transport of raw jute in Bengal is facilitated by many waterways with which that province bounds. The scope for the further spread of the industry is limited, as no other province in India possesses the unique natural advantages possessed by Bengal for the production and transportation of jute.

Future.—India holds a monopoly of jute; but neither the cultivator nor the industrialist can be said to have reaped the advantages of a monopolistic trade. The former is ill-organised and the latter has always had to contend with severe competition both at home and abroad. Herein lies the essence of the problem of Indian Jute. It is true that there is hardly any commodity which is, strictly speaking, a monopoly. Monopoly must be understood to imply more than unusual facilities for the regulation of supply and demand.

The jute industry's monopoly of the raw material is complete and absolute. The jute fibre from which manufactured goods are made is grown only in India

on a commercial scale, inspite of the attempts that have been made to cultivate it in other countries. Jute is a strategic raw material. It is not so important for a country at war as oil or steel but its absence is highly inconvenient to a nation at war as no satisfactory substitutes have been found.

The competitive capacity of any industry in world markets during the post-war period will be determined, to a large extent, by the efficiency of its machinery and the man-power it employs. This aspect of the question is now being slowly recognised by some of the major industries of this country, especially the textile industry.

It is doubtful whether Indian Jute mill industry will be in a position to compete with the Dundee industry abroad. May be, the comparatively lower level of wages prevailing in India will help the Indian Jute Mill Industry but on this one factor alone, the latter should not depend for its continued existence. Of all the Indian industries, it is well-known that the jute mill industry is very well organised, and it should, therefore, be easy for it to take any remedial measure. The machinery must be modernised and the efficiency of labourer improved. It should be noted here that the jute industry has been experiencing, for a number of years, prosperous conditions. As a result of many years of prosperity and careful husbanding of its resources, the industry has been able to add substantial reserves and it is therefore necessary that it should show more enterprise, in the present post-war period, to include in its manufacture many new lines of production, which it has until now left to foreign manufacturers to exploit.

It is certain that a continuance of the co-operative spirit which the industry has shown during the war years, will be of estimable value in the future and will help the transition from a war to a peace-time economy. It must, however, be noted that the prosperity of the industry and that of the Bengal Province lies in making available to the world supplies of cheap goods in competition with other materials such as cotton and paper. A wise and far-sighted policy should be adopted to place the industry on a stable basis and deal equitably with all the interests concerned. Recently, (June 1946), the Bengal Government convened a conference of the representatives of the Jute interests and discussed with them the question of jute prices and control measures. It is hoped that the Bengal authorities and the Government of India will be able to provide the necessary conditions for the stability and growth of the industry.

CHAPTER LX.

SILK.

1. **Introductory.**—Indian silk industry is very old. Silk rearing and manufacture were practised in India almost from pre-historic days. There was formerly a flourishing silk industry in India for supplying garments and fabrics for middle class requirements and for exports on a small scale. After the first world war, the imports of raw silk and silk materials from China and Japan began to compete with the Indian silk. Even more injurious was the competition of artificial silk which owing to its cheapness became popular among the poorer classes. The production of genuine silk declined. The industry clamoured for protection and the Tariff Board appointed by Government recommended certain protective duties for five years in the first instance. On the expiry of this period, a second Tariff Board was constituted in March 1939, and made certain recommendations. According to their Report, there were 105 silk weaving establishments in 1937 employing about 4,700 workers, but the great majority used imported silk. As a result, the sericulture industry (which produced the raw material) fell on evil days. The production of raw silk by the *charkha* continued and even in 1937 their total production was estimated at about 600,000 lbs. This silk was mostly used by handloom weavers for the manufacture of saris, shirtings and other garments. The Report of the Tariff Board was considered during war-time and owing to new developments, no special action was taken.

2. **War-time developments.**—During 1940 there was no demand for parachutes and the industry continued as in 1938 and 1939 though it did receive a little impetus owing to stoppage of imports from Italy and France. In 1941 however, it was decided to commence production of parachutes in India. Genuine silk was essential for this purpose. Some quantity was available in Kashmir and Mysore but it was too meagre. 1941-42 demands for statichutes were about 4,000 but 1942-43 demands were 10,000. 4,000 statichutes required about a lakh lbs. of raw silk. It was decided to start a Government Parachute Factory and to develop pure silk industry in India to make parachute components. With the deterioration in the situation in the Far East, His Majesty's Government, which had hitherto used Chinese and Japanese silk, emphasised the urgent need of conserving all Empire stocks and agreed to take all surplus quantities of raw silk suitable for service needs. At that time the Indian production of raw silk was estimated at 1,650,000 lbs.; of this the total existing Filature capacity being only 465,000 lbs. and actual Filature production about 385,000 lbs. and the balance of 1,265,000 lbs. was hand-reeled. To effect change over from hand reeling to filature reeling, the installation of 3,000 additional basins was essential. A survey was carried out and it showed that the production of Filature silk could be increased to 935,000 lbs. if HMG agreed to provide capital for the erection of basins by private parties in Mysore and Bengal and by the State and Provincial Governments in Madras and Mysore.

Accordingly in 1942 with the co-operation of H.M.G., a scheme of Filature expansion was undertaken by Government. Out of 2,900 basins which were erected under the scheme capable of producing when working to capacity about 850,000 lbs. of mechanically reeled silk. 700 basins were Government owned, rest being put up by private interests. The private Filature owners were given

loans equivalent to half the estimated capital cost in Mysore and a much smaller fraction in Bengal. Advances were also issued for working capital. The loans and advances except working capital to the Bengal Filatures carried interest. These basins were erected in the three main silk producing areas of India, viz., Bengal, Mysore and Madras. Kashmir was left out of the scheme as it had already a well established silk reeling industry owned by the State. A control was instituted over the prices and distribution of cocoons, the object being to enable Filature owners to get an adequate supply of cocoons at controlled price. The entire produce of raw silk was sold to the Central Government. The estimated values of silk purchased by Government during 1944 and 1945 came to Rs. 202 and Rs. 239 lakhs respectively.

In order to improve the quality of raw silk, one fully equipped conditioning house was established in Calcutta and two others were set up, one in Mysore (Chennapatna) and other in Kashmir (Srinagar). For increasing the production and supply of disease-free eggs of suitable strains in connection with the efforts for the extension of silk cultivation in India, as well as for the prosecution of research work in the disease of silk worms and mulberry, a Central Sericultural Station was set up at Berahampur (Bengal) with a sub-station at Kalimpong (Bengal) by the Government of India.

3. Future.—The total value of the imports during the nine years 1930-31 to 1938-39 was Rs. 267,660,000, i.e., about Rs. 27 crores or about Rs. 3 crores per year. The average of pure raw silk imports was about 2½ million lbs. per year. The imports were mostly from Japan and China (Italy coming third) and the average price paid for imported raw silk into India immediately before the war varied between Rs. 3-5-0 and Rs. 4-1-0 per lb. In war-time, the prices for Delhi Grade have ranged between Rs. 26 to Rs. 30 per lb. Before the war there was no export of raw silk except some exports of high grade silk waste from Kashmir and Jammu Filatures. There were, however, some exports of pure silk fabricated goods from Benares to U.S.A. and U.K. and from Bombay to Germany, Goa, Burma and Africa and from Madras to Burma and Ceylon.

Filature raw silk industry in India will still need Government assistance and watchfulness. Private enterprise in mulberry cultivation production and distribution of mulberry seedlings and grafts and production of silk worm eggs should be encouraged under Government assistance and financial help. Scientific research and a chain of conditioning houses are also essential to improve the quality of raw silk. India can take a leaf out of Japan's Book. Japan owes her pre-eminence as a silk producing country to the fact that she has made an intensive study of all the problems relating to sericulture for a period of more than 30 years. The position occupied by Japan as a silk producer is also due to the continued encouragement and assistance given by her Government to the industry. State assistance to industry appears to have begun in 1874 and good results were obtained only after a period of about 30-40 years. Quality and standardization accounted for Japan's success. Success was also due to the elaborate organization of research on the improvement of races of worms, cocoons and mulberry, aided by country-wide arrangements for control of diseases of worms and mulberry, for improvements of reeling machinery and reeling methods aided by the organization of production of standardized raw silk in bulk and its marketing, improvement of looms and methods of weaving, dyeing, printing and finishing aided by organized production of standardized fabrics and their marketing; and, investigations of demands in foreign consuming countries and spread of this information among the weavers.

In conclusion, there can be no doubt that India has a great potentiality to expand her silk industry. The following measures are suggested:—

- (1) Investigating new types of mulberry leaves so that as small as possible quantity of leaves may be required for rearing;
- (2) Experimentation with improved methods of mulberry cultivation;
- (3) Important new strains of good seeds to implement the existing and also improve the indigenous breeds by cross breeding;
- (4) Developing remedial measures for curing diseases of silk worms;
- (5) Propagating and popularising Indian raw silk in the international market;
- (6) Affording assistance to import necessary machinery;
- (7) Encouraging Provincial and State Governments to extend areas under mulberry cultivation;
- (8) Encouraging erection of maximum number of basins;
- (9) Making available the results of the experiments carried out at the two proposed Model Filatures to various Provinces and States;
- (10) Providing higher education in sericulture by making sericulture compulsory subject in agricultural colleges; and
- (11) Tariff protection, if necessary.

CHAPTER LXI.

CHEMICALS.

1. **Introduction.**—The range of chemicals in modern economy and their various uses have become illimitable. Chemicals can be divided into two classes. The major ones, among them sulphuric acid, soda ash, ammonia or ammonia salts etc., are called heavy chemicals because their production as well as consumption are on a heavy scale. Other chemicals used on a small scale and also produced in smaller quantities are called fine chemicals but these latter are more numerous—as many as 4,000 in number. They are also of vital importance in industrial production in peace and in war. Chemicals play a large part in the industrial development of a country and important industries like textiles, mining, engineering paints, plastics, leather, drugs, timber, sugar, matches, glass, paper, rubber etc., could not be what they are without them. Textiles consume such chemicals as caustic soda, alkalis, acids, bleaching agents, non-shrink chemicals and dyestuffs in large variety. The fundamental chemicals required in mining industry are explosives with their auxiliaries detonators and fuse. Metalliferous mining consumes considerable quantities of chemicals in ore treatment—cyanides, copper sulphate, lead nitrate, and in flotation—pine oils, anthates, alkalis and salts. Primary industries may be taken to include a very wide range of rural occupations, the major object of which is to provide the human race with food. Agriculture and Horticulture require fertilisers also weed-killers, pest control agents, such as insecticides, fungicides, fumigants and auxiliary materials, wetters and spreaders for sprays, plant hormones and minor deficiency correctives.

Wood from forests calls for the use of timber preservatives and white ant controls, and glues and resins and bonding. Food processing uses a great deal of chemical products such as tartrates and phosphorous compounds for aeration in baking, edible acetic for pickles. Many drugs like sulphonamides together with various narcotics, anaesthetics, are products of the synthetic chemical industry.

The treatment of water is essentially a chemical one and a consumer of basic materials such as Soda Ash, Sodium Aluminate, Aluminium Sulphate, Trisodium Phosphate, Hexametaphosphate and other organic materials including tannins. Glass requires soda ash and also sand. Paper making requires chlorine, sodium sulphate and wood. In the organic Chemical Industries, numerous types of products such as soap, oils, wines etc., are produced. Products such as soap, coal-tar derivatives, rayon and glass depend on the heavy chemicals.

Chemicals are required for metal treatment processes such as case-hardening or more resistant to corrosion, e.g., pickling with acids, galvanising, chromium, nickel or copper plating. Refrigeration and Air Conditioning—a subject which captures the imagination—uses ammonia, sulphur dioxide, freon, ethyl chloride and materials for compounding refrigerating brine, such as calcium chloride and magnesium chloride. Maritime Engineering calls for inhibited acids for descaling of condensers in ships and the degreasing of oil coolers. Trichlorethylene and trisodium-phosphate are used for degreasing, whilst inhibited mineral acids are used for descaling. Electrical and Radio Engineering use many chemicals in the form of plastic products. Some of the newer plastics are of primary importance for their special insulating properties. Dry batteries and Le Clanche cells are well-known, and both are based on chemicals.

The Paints and Plastics group of industry has become very prominent during recent years. It is said that we are entering a new Era—the Plastics Age—in which we are to wear plastic clothes, ride in plastic cars and aeroplanes, live in

pre-formed plastic houses and finally being buried in plastic coffins. Plastics depend on Synthetic Chemistry.

From the above, some idea of the great importance of chemicals and enormous possibilities of chemical development will be quite clear.

2. Pre-war.—The chemical industry requires (a) raw materials such as coal, limestone, salt, sulphur etc.; (b) finance; (c) technical knowledge and skill; (d) electrical power, and (e) plant and machinery. India suffered from a considerable disadvantage when compared with America and other European countries where big hydro-electric schemes were developed. The country also did not have adequate chemical plant and machinery and had to depend on imports. India lacked a well developed heavy chemical industry which constituted a serious lacuna in our industrial structure. Before the war some 20 factories were manufacturing sulphuric acid. The alkali industry was practically non-existent and some of our main industries such as textiles, paper, soap, etc., had to depend on imports for important chemicals. Some new companies, the Alkali and Chemical Corporation of India Ltd., the Mettur Chemical and Industrial Corporation Ltd., Messrs. Mysore Chemicals and Fertilisers Limited, Tata Chemicals Ltd., etc., were started in the 1936-37 boom which began to bear fruit during war-time.

3. Developments during war.—As a result of war, increasing difficulty was experienced in obtaining chemical requirements needed to maintain a generally expanding industry at full production. On the out-break of war, chemical manufacturers were advised by the Supply Department to give special attention to the manufacture of certain heavy chemicals, namely acetic acid, lead acetate, sodium and potassium bichromates and caustic alkalies. Considerable progress was made in the development of heavy chemicals. The factories set up during 1936-39 went into production in 1941-42. Requirements of chemicals were satisfied to the extent of about 70 per cent. The production of chemicals in India is now three-times the pre-war production. Production could not be further increased owing to the difficulty of getting plant and machinery. Power, coal and transport have been great bottlenecks. Even then the war did give a fillip to the Indian industry.

A. HEAVY CHEMICALS.

(1) Sulphuric Acid.—Sulphuric acid may be regarded as the "Key industry" for all chemical industries. The consumption of sulphuric acid is considered an index of a country's industrial development. As the acid is extremely cheap and also excessively corrosive, freight charges are heavy and it is necessary to manufacture it in certain centres where large quantities are required. It has to be packed in stone-ware bottles. All this increases the weight for transport. These difficulties have offered a virtual protection to the industry and encouraged its production in the country. It is the vital basic chemical for almost all industries. From it are produced other important chemicals essential for a variety of purposes. There is an extensive demand for this chemical (a) for textile finishing, (b) filling accumulators, (c) leather tanning, (d) pickling of iron and steel before galvanising and tinning, (e) explosives, (f) manufacturing chromic acid required in electro-plating, and (g) non-ferrous metallurgy (i.e., cleaning of brass, bronze and copper sheets and wires). It also enters into the manufacture of other important chemicals, namely hydrochloric acid and nitric acid, copper sulphate, magnesium sulphate, ferrous sulphate, bichromates and aluminous sulphates and above all for the production of fertilizers like ammonium sulphate and superphosphates.

The productive capacity of the plant existing before the war was 85,000 tons, but as the actual demand was about 26,000 tons only, the production of

the then existing 30 acid factories was limited to this extent. The factories utilised imported sulphur obtained from Italy and Japan.

Sulphuric acid enters extensively into munitions production and is also required for the manufacture of essential war supplies. With the out-break of war, demands for sulphuric acid increased tremendously and the available production was inadequate for the Defence and Civil requirements which were about a lakh tons per annum. Several new plants were installed in 1943. Its shortage added to the difficulties of industries such as textiles, leather tanning, paints and pigments and acted as a handicap to the manufacture of other important derivatives such as alum salts and bichromates. It was, therefore, found essential to impose statutory control upon the distribution and prices in 1942 and the Sulphuric Acid Control Order, 1942, was issued by the Supply Department. Prices as originally fixed in 1942 were later revised from time to time in consultation with the Sulphuric Acid Manufacturers' Association. This Order was withdrawn from 1st April 1946.

Present capacity is over 90,000 tons per annum. India experienced difficulties in arranging for sulphur for the production of acid. Some deposits were located in Baluchistan at Koh-i-Sultan and arrangements were made to obtain sulphur from America under Lease-Lend. The new capacity developed during the war is mostly by chamber process by utilising available raw materials, viz., lead sheets, steel and timber, and it is not so economic as the production from contact plants.

The quantity of sulphuric acid at present utilised for nitric acid and bichromates is likely to be reduced to half. The surplus could be utilised to produce alum, magnesium sulphate, super-phosphates etc. As the industries consuming it are already established on a fairly sound basis, e.g., textiles, iron and steel, oil refineries, the consumption is not likely to fall in the post-war period. In fact, there is likely to be a greater demand on account of rapid industrialisation. Four contact plants imported from America have been installed and are expected to commence production shortly. It is possible that large deposits of gypsum may be exploited as an alternative source of sulphur. India's dependence on imported sulphur will be much less than it is at present.

(2) **Caustic Soda.**—Caustic soda is an important chemical second in importance to sulphuric acid for development of the chemical industry. During the First World War India imported about 2 to 3,000 tons of caustic soda valued at £75,000. Imports during 1917-18 amounted to 8,500 tons valued at £230,000. Caustic Soda is an essential raw material for many industries, the chief being soap, glass, dye works, coal-tar, oil refineries, textiles, paper, vegetable ghee, leather etc.

Little attention was paid to the production of caustic soda in the pre-war period. A few companies were floated shortly before the war. The raw materials for the manufacture of caustic soda are available in the country in large quantities and at cheap rates; the only difficulty is lack of cheap electric power.

The Second World War benefitted the factories by creating a welcome demand for their products. The indigenous production was developed—1,500 tons by Messrs. Alkali and Chemical Corporation of India and 2,000 tons by Mettur Chemicals and Industrial Corporation at Metturdam in South India. Some textiles and paper mills have arrangements for producing caustic soda for their own use. A great future lies before this industry as the production is far below the requirements. Several plants of 8 to 10,000 tons capacity per annum can be established. Cheap power is likely to be available in the post-war period with the development of hydraulic reserves. Packing etc., also does not present serious problems as caustic soda can be packed in non-returnable drums made of

mild steel. Negotiations for the import from U. S. A. of three caustic soda-chlorine plants with an aggregate annual capacity of 10,000 tons are going on.

(3) **Soda Ash.**—Soda Ash is known to the housewife as washing soda and is used for many purposes in the manufacture of aluminium, paper, soap, textiles, glass, oil refining, leather and several other industrial purposes. At present two factories—Messrs. Dhargadhra Chemical Works and Messrs. Alkali Chemical Corporation of India Ltd., Khewra, are in production. Tata Chemicals are expected to come into production shortly. These factories are manufacturing soda ash by Ammonia Soda process. Dhargadhra's production is 18,000 tons per annum, Khewra's about 20,000 and Tata's anticipated is 18,000 tons.

As industrialisation drive is launched, demands are likely to increase. Even at present there is a gap of 25,000 tons between production and consumption. Indigenous production should aim at at least 100,000 tons in future. All raw materials are easily available in the country. Ammonia or its salt (Ammonium Sulphate) will also soon be available as ammonia sulphate (fertilisers industry) is being firmly established.

(4) **Bleaching Powder and Chlorine.**—Chlorine is a by-product of the electrolytic manufacture of caustic soda. With the development of the Alkali Industry, large quantities of chlorine and bleaching powder will be available. Chlorine is widely used industrially. Increasing demand during the war came largely from its use in degreasing compounds employed in metal-working plants and from the immense demand for hexachlorethyne, the smoke-producing chemical, so widely used by the three services and without which many operations would be impossible. The main industries which depend on bleaching powder are paper, textiles and surgical dressings. It is used for bleaching of textiles and paper pulps whilst large quantities are also required for the sterilisation of water and for hospital disinfectants. No manufacture on a large scale was undertaken in India owing to non-availabilities of cheap powers. Its manufacture is subsidiary to the manufacture of caustic soda by electrolysis. India requires over 10,000 tons per annum.

The Mettur Chemical and Industrial Corporation is producing about 4,000 tons. The balance of 6 to 7,000 tons is met by imports. Stabilised bleaching powder was required by Defence Services. So a Government plant was put up at Rishra at a cost of rupees ten lakhs by Imperial Chemical Industries, Ltd., but it could not start production owing to inadequate supplies of lime, labour trouble occasioned by air attacks at the end of 1942 and change of decision of the Defence Authorities regarding containers. Messrs. Rohtas Industries also have a bleaching powder plant of 1,250 tons capacity. Most of the indigenous production is ordinary bleach which is likely to deteriorate in the tropical weather.

Paper production and sanitary requirements are likely to increase now. It is true that some paper mills and municipalities prefer liquid chlorine to bleaching powder, as liquid chlorine has great advantage over bleaching powder especially when the fabric is to be dyed subsequently. If plants for further production of caustic soda are installed, a lot of chlorine and bleaching powder will be available and which can be used for the production of some fine chemicals.

(5) **Bichromates.**—Bichromates are of two forms: Sodium Bichromate and Potassium Bichromate. They are used chiefly for khaki dyeing, chrome tanning, yellow and green pigments. Potassium bichromate is also used by the match industry. There was no pre-war production of bichromates in India, but the consumption was about a thousand tons per annum.

With the outbreak of war, there was a large increase in consumption due to the increased production of khaki cloth and increased out-turn of chrome leather. The demand rose to 3,000 tons a year. Production of this chemical was especially fostered by Government and a promise of protection given. Imports of bichromates fell off. So Chrome Compounds were brought under control. Several plants came into being such as Pioneer Chrome Works, Binny's plant at Madras, etc.

Good quality chrome ore is available in Bihar and in Mysore State and some small quantities in Baluchistan. Soda ash, lime and sulphuric acid, the other raw materials are also available. The present cost of production works out to Rs. 85 to Rs. 100 per cwt. During war, both production and distribution were controlled by Government. At present there are 12 plants with a production of about 300 tons per month, concentrated at Madras, Bombay, Calcutta, Cawnpore and Nagpur. Demands are coming down resulting in considerable amount of internal competition which should weed out the inefficient units. The industry would be well advised to amalgamate and concentrate production at the more efficient and better situated plants. It should also secure the latest pulverising machinery and machinery for proper mixing of ingredients, etc.

Chromic acid is also prepared from bichromates and mostly used for chrome plating. The total annual production is about 100 tons.

(6) **Potassium Chlorate**.—Potassium chlorate is mostly used for the match industry and blasting powders. The pre-war consumption was 1,500 tons but it was all imported mostly from Sweden, Germany and Japan. With the German occupation of Norway, supplies from Sweden were cut off and there was a world shortage. Indigenous production was developed and two firms Messrs. Western India Match Company, Ltd., and Mettur Chemicals Corporation set up plants with a capacity of 1,800 tons per annum. The chlorate industry in India may not stand foreign competition during post-war period owing to the high cost of production and very high prices demanded for raw material.

(7) **Saltpetre or Potassium Nitrate**.—This chemical is mainly used for the manufacture of gun powder. Up to 1860, India was the only source of saltpetre, but the discovery of a method of making saltpetre artificially hit the Indian trade very hard. Since then Indian exports gradually declined from about 35,000 tons in 1860 to about 15,000 tons in 1914—when it again got a fillip as a result of first World War and exports rose to about 30,000 tons. The industry, however, began to decline with the Armistice in 1918. Since 1919 the industry has been in a moribund state. The second World War again gave stimulus to this industry. The pre-war production of about 10,000 tons continues, though prices have arisen.

The industry is confined to Bihar, U. P. and the Punjab and is more or less on a cottage basis. No modern apparatus or motive power is employed. Potassium Chloride, however, comes as a by-product and it has been in great demand for the manufacture of potassium chlorate. High prices have been obtaining for this by-product. Large tracts of saline earth suitable for extraction of saltpetre are available and their utilisation will depend on the utilisation of saltpetre for manure, etc.

(8) **Sodium Sulphite**.—In pre-war years the chemical was wholly imported and imports amounted to 1,500 tons. Demand suddenly increased during the war. In the beginning 3-4 small firms at Agra, Bombay and Calcutta started production of sodium sulphite. The Supply Department have been encouraging the Jodhpur Government project to produce 10 tons a day in 4 units. The factory was to take sodium sulphate from Didwana where it is available in plenty as a by-product of salt manufacture. The factory, however, has not yet come into production and the State Authorities are contemplating to lease this factory to private firms.

(9) **Alums.**—A number of products are described as alums. Important amongst these are Alumina Ferric, Aluminous Sulphate, Potash and Chrome Alum.

The first three types of alum are produced indigenously by almost all the manufacturers of sulphuric acid. The raw materials are bauxite and sulphuric acid. With the increased production of paper, large quantities would be required. Annual requirements for public health, water purification, paper sizing, textile and other miscellaneous requirements are 3,600, 4,300 and 1,000 tons, respectively. Some alum was also used in the production of foam type fire-extinguisher refills in war-time.

Pre-war consumption was about 7,000 tons while at present it is more than 16,000 tons. Imports are confined entirely to iron free sulphate of alumina amounting to a few hundred tons per annum. Government demands for Defence purposes came to only about 15 per cent. The chemical was statutorily controlled in war-time owing to shortage.

With increased production of sulphuric acid, production can be stepped up as large deposits of bauxite are available and no special plant or machinery is required. The possibility of establishing production somewhere in U. P., rich in bauxite and coal depots should be explored.

(10) **Calcium Chloride.**—

	Tons
Pre-war production	Nil
Pre-war consumption	1,000
Present production	1,200

Calcium carbide is being produced by only one firm Messrs. Magnesia Works. Government gave an assurance of protection against unfair import competition. The present selling price of the indigenous material is higher than the imports. The firm will have to adopt rather more efficient methods of production than at present.

B. FINE CHEMICALS.

Unlike Heavy Chemicals which are used mainly as raw materials, fine chemicals are directly consumed as finished products like perfumes and drugs. Further, heavy chemicals are produced and consumed in hundreds of thousands of tons, and in some cases, millions of tons, whereas the production and consumption of fine chemicals are only of the order of thousand of tons. Nevertheless, the numerous products (as many as 4,000) coming under the category of fine chemicals are of vital importance in peace and in war.

Fine chemicals industry in India is still undeveloped except for the manufacture of tinctures and a few pharmaceutical preparations on a very small scale. Most of them are prepared from imported products. The raw materials of fine chemicals are the products of the distillation of wood and coal-tar. India, at present, has only a small wood distillation plant attached to the Mysore Iron and Steel Works. There are also one or two small plants for coal-tar distillation, but no chemical industry has been built up on them.

(1) **Acetic Acid.**—It is a by-product of wood distillation and is used in the rubber industry and in the manufacture of lead acetate, white lead, dyeing medicines and cellulose acetate. The pre-war production was only 50—60 tons a year with a capacity of 200 tons, the major portion of which was exported as Calcium acetate. There was a great demand for acetic acid during war and Parry & Co. set up a plant with a capacity of 150 tons a year at the instance of the Supply Department. The Mysore Government also put up a plant with a capacity of 600 tons a year.

(2) **Acetone.**—This is another by-product of wood distillation and its main demand is for the manufacture of explosives. Only a small quantity of this demand is met by indigenous production. The Cordite Factory at Aruvankadu attempted to produce acetone from calcium acetate, another by-product of wood distillation, but due to the limited supply of calcium acetate which was available only to the extent of about 1,200 tons a year, only about 150 tons of acetone could be produced annually. It was, therefore, decided to produce acetone from alcohol available from distilleries. A plant was specially imported by Government Cordite Factory and is producing 700 tons a year.

(3) **Formaldehyde.**—This is produced from methyl alcohol, a by-product of the wood distillation industry. Considerable quantities of formaldehyde were produced in India during 1929-1932 at Kirloskarwadi in Satara District from methyl alcohol obtained from Mysore. But the levy of an excise duty on methyl alcohol by the Bombay Government led to the closing down of the plant and there was no production when the war started. As a result of the investigation by the Board of Scientific and Industrial Research, the Indian Institute of Science, Bangalore, set up a pilot plant. But it did not work efficiently. Later, the Mysore Iron & Steel Works brought the Kirloskarwadi plant and even duplicated it and are in a position to produce about 60 tons of formaldehyde a year.

(4) **Chlorosulphonic Acid.**—This is the basic chemical for the manufacture of a number of products like Saccharine, drugs and Chlaramine T. There was no indigenous production before the war. During war Mysore Chemicals and Fertilisers Company put up small locally fabricated plants at Belagula in Mysore for the manufacture of this chemical. About 2 tons of chlorosulphonic acid a month are produced by this firm and mainly supplied to the Haffkine Institute, Bombay, for the preparation of Sulphanilamide drugs and to the Central Board of Revenue for producing codeine.

The post-war prospects of the industry are good for two reasons. The main raw material for chlorosulphonic acid is fuming sulphuric acid which can be obtained from the contact sulphuric acid plants and on account of its dangerous and corrosive character, the freight charges on imported chlorosulphonic acid would be very high and would thus give a virtual protection to its indigenous manufacture.

(5) Air Foam Solution.

	Gallon per mensem
Pre-war production	Nil
Present production	15,000
Potential production	35,000

Practically the whole of this output was purchased by Government in war-time. The pre-war demand was very small and the post-war demand is not likely to be large but dependent very largely upon the marketing abilities of the producers.

(6) Stearic Acid.

	Tons per annum
Pre-war production	Nil
Present production	450
Potential production	450
Pre-war consumption	2,300

During the war about 1,000 tons were also required for the production of flame-thrower fuel for the Army. The present import price is about Rs. 1-6-0 per lb. which is about the same as the production cost although the latter varies with the price of tallow which is also in short supply. The pre-war price of stearic acid ranged from less than four annas per lb., for single pressed up to eight annas per lb., for tripple pressed. Judged on present prices the indigenous industry should be able to maintain manufacture in the post-war period. Unfair competition from the oil companies which are the importers is the only problem for the industry.

(7) Glycerine—

	Tons per annum
Pre-war consumption	100
Pre-war production	650
Present production	2,000
Potential production	2,000

During the early years of the war, Government bought the total production except for a few hundred tons released to meet the demand of the civil market. Later on, however, Government demands only amounted to 25 per cent. of production. The post-war demand should remain well above the pre-war offtake especially in the pharmaceutical industry. There is also the possibility of developing an export trade especially in the Far East.

(8) **Photographic Chemicals.**—These include sodium thiosulphate, sodium sulphite, sodium metabisulphite and hydroquinone. Before the war India required about 500 tons of sodium thiosulphate and 100 tons of sodium sulphate a year, but there was no indigenous production to meet this demand. During war small plants were set up and were able to meet total Indian requirements of 800 tons of sodium thiosulphate and 300 tons of sodium sulphite. As the plants at present are of merely make-shift type, the cost of production is much higher than that of the imported materials. The main raw materials namely soda ash and sulphur are imported. If the firms improve their equipment, there is reasonable chance of the industry surviving the war, although it will have to face foreign competition.

(9) **Coal-Tar Products.**—India is singularly deficient in coal tar intermediates as no coal tar distillation worth the name is practised in India. Coal tar is a by-product in the manufacture of coke. Coal on distillation gives three primary products; (a) coal gas; (b) coke and (c) tar. The carbonisation of coal is carried out in the Tata Iron and Steel Works and Indian Iron & Steel Works. The normal by-products obtained from coal tar are creosotes; naphthalene; benzene; toluene; phenol; cresylic acid; higher hydrocarbons; pyridine bases, etc., and road tar.

Crude creosote is produced in an unsatisfactory manner. The pre-war production figure was about 3,000 tons which later on rose to 4,800 tons per annum. The estimated requirement is about 15,000 tons per annum. A very small quantity of naphthalene was being manufactured in India. India was importing about 400—500 tons per annum. In war, demands rose to 800—1,002 tons per annum and the entire quantity owing to stoppage of imports had to be met by increased production in India.

Indian coal tar is eminently suitable for the production of naphthalene, as owing to high temperature employed for carbonisation, polymerisation takes place on the walls of retorts producing larger quantities of naphthalene type of

compounds than is the case when coking is done at a moderate temperature. The future prospects of this industry are bound up with the development of industries using the various products of coal tar distillation. There is a crying need for coal tar products and their development will also help the fine chemicals and the drug industries.

Future.

The essentials for the future development of a chemical industry fall under five main heads:—

(a) Raw materials—coal, limestone, salt sulphur and vegetable matter suitable production of alcohol;

(b) Finance;

(c) Technical knowledge and skill;

(d) Electric power; and

(e) Manufacture of chemical plant.

India possesses abundant deposits of coal, limestone, salt and material for alcohol fermentation but is deficient in sulphur. It must, therefore, rely upon overseas sources of supply for sulphur, which in normal times are America, Italy and Japan. As regards money, there is ample capital available in India and anxious to finance a very substantial chemical industry. Then comes the technical knowledge and skill to erect and bring the various manufacturing units into operation. Here India is in some difficulty. Although there are large numbers of good research and laboratory chemists in India, there are comparatively few chemical engineers or industrial chemists. As industry develops and more people become trained, this difficulty will tend to disappear but initially some co-operative action is required on the part of Government and Indian industrialists to meet the deficiency by establishing facilities for the study of chemical engineering at Indian Universities and by sending chemical engineer graduates abroad to England, America and other countries for practical experience. This is already being achieved under the Overseas Training Schemes. As regards power, India is fortunate in possessing a large number of mountain ranges stretching from the Himalayas in the north to the Nilgiri Hills in the South and the possibilities of hydro-electric power generation are most favourable.

The last point for consideration is the necessity for establishing a chemical engineering industry which could produce the special types of alloys and other materials in the various forms required. It is obviously highly unsatisfactory for any industry to have to rely upon manufacturing units situated thousands of miles away for spares and replacements, and side by side with the establishment of a chemical industry should go the establishment of manufacture of plants required by the chemical industry. There appears, therefore, no reason why India should not become a large chemical producer provided development follows well defined lines forming part of a general plan. But it is important that development should follow sound planning. If production is established piecemeal and in small economically inefficient units it will never be possible to meet foreign competition even with substantial Government protection. Though the chemical industry has expanded during the war to about three times the pre-war output, it must be stated that the difficulties of obtaining plant and machinery operated against the establishment of factories for producing several important chemicals. The general chemical industrial development in India should proceed in accordance with some well defined and co-ordinated plan. The country can take advantage of the developments during war and look to the future with optimism.

Future developments should have, as their aim, (a) improvements in the existing industries with a view to reducing the cost of production to competitive figures, and (b) planning of new industries for which raw materials are available in this country. This can be done effectively only with the assistance of Government by way of (i) tariff protection and subsidies, (ii) facilities for cheap transport of the raw materials and finished products within the country, (iii) help in obtaining raw materials and plant not available in India, and (iv) direct financial assistance wherever necessary. Further, attempts should be made to:

- (1) investigate whether basic electrical industries could be brought into being in this country at an early date,
- (2) examine the raw materials, plentifully available in India, which could replace costly raw materials and thus reduce the cost of production,
- (3) devise and adopt new processes of manufacture which would cheapen the production, and,
- (4) encourage the manufacture of chemical plants in India.

To ensure success, it is necessary that close liaison exists between scientists and industrialists, and maximum advantage is derived from research. Towards this end, the establishment of research laboratories, like the proposed National Chemical Laboratory and similar other scientific institutions to be started under the auspices of the Council of Scientific & Industrial Research, should be followed by other organisations of a similar type in which problems of individual industries could be investigated.

During the past few years, several industrial experts and technical missions from the U. K. and U. S. A., have visited India, and delegations of many Indian scientists and industrialists have reciprocated these visits. Also, planning committees have been set up by the Central and Provincial Governments, and by some Indian States, to advise on post-war development schemes. The reports made by the foreign and Indian experts and by the several committees contain considerable information regarding the availability of raw materials in India, projects for the production of cheap electricity, the figures of existing production and consumption of heavy and fine chemicals in India and the targets of production if certain industries are established. It will be imperative to fully utilise the data given in these reports before launching any scheme for the production of heavy chemicals in India.

Scientifically speaking, there is no limit to the development which can take place in the Chemical Industry. The Chemical Age really started with the last war and is still only in its infancy. Research has made it possible to regard chemical elements more or less as bricks and the designs into which they can be combined are without limit. While the properties of a great many thousands of such compounds are known, there are endless combinations yet to be assembled and no doubt many of these will become of some use in industries and welfare of man. Thus, Chemical Industry will have no finality. In practice, however, the economic limit is reached when manufacture in any particular country is unable to compete in cost with imports, that is to say world competition will be the limiting factor of the development of chemical industry in this and any other country. Thus the long distance view is hard to see in any clarity of detail.

CHAPTER LXII

TIMBER INDUSTRY.

Introductory.—Forests cover a large area in India. In British India, 94,457 square miles or about 11 per cent. of the total area is under forests and there are also extensive tracts in the States. The forests of India contain all kinds of trees—alpine, temperate and tropical. The higher altitudes of the Himalayas are covered with alpine forests, and the base with tropical forests, while there is a temperate region in between covered with temperate species. The forest products of India are divided into two classes; Timber and Fuel or "Major Products", and "Minor Products" which include a large number of products of forest origin. The minor group includes such articles as bamboo, sabai grass, munji grass etc., for the manufacture of paper, tanning and dyeing materials, resin, lac, oils and other substances which yield a very large revenue to the State. There is a large number of commercial species of Indian woods and in some instances as many as a dozen different grades of one kind of timber are recognised.

Before the first world war, the export trade in timber consisted chiefly of teak followed by sal, deodar, sisoo, black wood and sandal wood. The teak export trade had a continuous development up till 1895-96 after which it has been on the decline owing to the increasing internal demand. Along with the export trade, India also developed an import trade. Large quantities of cheap timber from Europe, America and Australia and a considerable tonnage of Burma teak were imported annually. For instance about 1915, 50,000 cu. tons were exported while about 100,000 cu. tons were imported. During the first world war, the Munitions Board established large timber depots all over the country in different places, e.g., Bombay, Rangoon and Karachi. Timber was supplied for the construction of bridges, piers, wharves, buildings, temporary huts and lines, telegraph poles and wood of suitable species for boat-building and repairs, aircraft and rifle stocks and bamboos for river-training works, tent poles, lance staves and mosquito poles. The measures for seasoning had not been developed but fortunately for the greater part of the demands unseasoned timber was good enough. The Indian Munitions Board from April 1917 to December 1918 received indents for about 300,000 cft. and despatched or shipped about 250,000 cft. of timber.

In pre-war days India utilised the bulk of her timber production for buildings, agricultural implements and rough furniture and railway sleepers. Generally speaking, the bulk of Indian timbers are of a rough general utility type not suited to high class work unless carefully seasoned or converted into products like plywood, pressed boards, etc. India is deficient in high grade hardwood timbers like teak and in good quality soft-wood timbers of the coniferous or dealwood type which play such a large part in timber economy throughout the world and she had to depend for the bulk of her railways requirements of teak for carriage and wagon building and other high class work on Burma.

In short in pre-war days India had to import considerable quantities of teak and other hardwoods from Burma and of softwood timber from Europe, the United States of America and Canada. The Indian plywood industry was in its infancy and the bulk of India's plywood requirements and tea chests were imported. The wood preservation industry had scarcely started and there was no rational utilisation of India's large resources of perishable and semi-perishable timber.

During war-time.—(a) Importance of timber in war.—The great part played by Indian timber in the second world war is probably not generally known. Due to the fact that European sources of timber supply fell largely into enemy hands, India was called upon to meet not only the very large timber requirements of the armies in India but also about eighty per cent. of the total requirements of the armed forces in the Middle East and Iraq. The great bulk of the timber demands of the United Nations forces from Burma in the East to Tunisia in the West were met by India. The war uses of timber are legion. It is required for the armies and navies in India and overseas, shipbuilding, wharf and jetty construction in India and overseas, construction of huts, Indian railways, army vehicle bodies, ordnance factories and numerous other military and essential civil purposes. Tremendous quantities are required for ammunition boxes, food cases, crates, building purposes and a thousand other uses. The army also requires thousands and thousands of telephone and transmission poles for field communications.

Prior to this war, timber was looked upon as an old-fashioned raw material useful for such things as barn door and newsprint. Owing to its disadvantages such as tendency to warp, susceptibility to fungus and insect attack, there was a tendency towards the substitution of metal for wood. To-day these disadvantages are being overcome and the demand for timber outstrips the supply. History is turning a full circle and once again Civilisation is on the threshold of an Age of Wood.

Under the wand of the plastics chemist, wood or wood products have become anything from a bullet-resistant windshield to a rayon parachute, a shell nose, a machine gun drum, or perhaps a sponge. Now in peace-time, it becomes fire-resistant wallboard, an automobile part, or any one of thousands of articles. As plywood, it has been shaped into the body of bombers. Such wood may be used for gasoline cans, hand luggage, automobile body parts, book covers, furniture, fluorescent lighting troughs, refrigerator shells, culverts, moulded walls, life-boards, and myriad other items.

As nitrocellulose, it has taken the place of cotton for making high explosives. As paper, it fills the tip of a bullet. And in its natural state, it has proved itself a rival of steel in large-scale construction. More prosaically, but in greater quantities, it has packed universal carriers, tanks, shells, and other war supplies and propped up mine shafts. It formed beds of ties for the rail movement of an unprecedented flow of war materials. It has gone into the construction of hangars, barracks, docks, wartime houses, and other war buildings. It is replacing steel in airport drainage pipes. It has been used more of it than ever before—in the construction of naval craft and merchant ships. In short, it has performed thousands of tasks for war which will be paralleled in peace-time.

(b) Demands during the second World War and how they were met.—The first effect of the war was the cessation of imports of timber into India from Europe, the United States of America and Canada due to shipping difficulties and the earmarking of the timber resources of these countries for war theatres in the West. By the beginning of 1940, India was called upon to meet the entire timber requirements of the Middle East Campaign and later on of the Allied Forces in Iraq and the Persian Gulf.

With the Nazi conquest of Western Europe, culminating in the collapse of France in June, 1940, the war suddenly became a struggle for survival. The industry was called upon to provide the needs of a suddenly expanded United Nations war programme. Plans for the construction of new munitions factories and for establishments for the armed services were revised upwards on a large scale. A large quantity was required for the construction of huts for accommodating troops and for Prisoners' camps. The conflicting needs of export.

the armed forces and war industries threatened the efficiency of the war effort. From 1942 onwards India's own military demands for timber began to increase rapidly owing to the needs of the war against Japan. The loss of Burma and the Andaman Islands aggravated the situation. By 1943 the timber and woodware demands in India, which had by then become an important operational base had increased to an extent which made it impossible for India to continue supplying timber to the Middle East and Iraq, and from the end of 1943 all shipments overseas had to cease. The production rose rapidly. From 242,000 tons in 1940-41, 753,000 tons in 1941-42 and 863,000 tons in 1942-43 the figure for timber production rose to 1,274,000 tons in 1943-44. It was about a million tons in 1944-45.

Impressive as these figures are, they do not convey an idea of the range and variety of articles supplied. These include rough and sawn timber of all kinds, ballies, telegraph and transmission poles, railway sleepers of various types, jetty piles, pit props, wharf timbers, bamboos, and a large variety of woodware, such as tent poles, tent pegs, camp furniture and equipment, ammunition boxes, battery boxes, boot boxes, packing cases, shoe lasts, axe helms, tool handles, rifle butts, plywood, etc. The supplies of two items alone *viz.*, tent poles and tent pegs ran into millions. Several varieties of aircraft timber, notably fir and spruce were being obtained from the Punjab and other parts of India.

India's own demands for direct and indirect war purposes exceeded 1½ million tons annually but in effect supply was limited to about 1 million tons annually primarily due to transport difficulties and shortage of labour for felling and conversion.

Major demands came from the Engineer-in-Chief, Quarter-Master General in India, Director General of Ship-Building and Repairs, Railways, Provincial Governments, Central Public Works Department, etc. Besides there were large demands for manufactures of woodware and for sawn timber for lorry bodies. Engineer-in-Chief's demand alone for sawn timber, ballies and telegraph poles came to over a million tons.

To meet these large demands for Indian timber and to control prices at reasonable levels, supplies since 1940 were organised through Provincial and State Forest Departments who tapped supplies at the primary source of production and sold lots of standing trees to traders on the condition that the converted timber was made available to the Timber Directorate at pre-empted prices which were announced at the time the sale of standing trees took place. The prices concerned in addition to the royalty to the Provincial Forest Departments, a reasonable cost of extraction and a fair profit to the lessee. The system generally worked well and led to a more effective price control than would otherwise have been possible in face of demands which absorbed nearly 100 per cent. of India's production of good quality timber. The value of timber purchased during 1941 to 1944 and 1945 came to about 10—12 crores per annum.

Great developments have taken place in plywood, sawmilling, etc. industries and the salient features are given below:—

(i) *Sawmilling*.—Before the war Sawmilling in India was rather in an undeveloped state. There was very little modern machinery at work in any province except perhaps on the Malabar Coast. When Burma teak was easily obtainable at reasonable prices nobody bothered about inferior Indian timber. With the entry of Japan into the war and the loss of Burmese supplies, it became necessary to utilise these timbers to the fullest possible extent. Sawmills were erected by Government and sawmilling was encouraged locally. No modern machinery being available, light-hand machines were utilised.

Three sawmills, one at Ghorpuri, one at Khandwa and one at Seoni were established. Later portable mills were established at Bombay and Calcutta. A large second-hand band mill imported from America was erected at Jhelum. The capacity of private sawmillers was also utilized. Seasoning kilns were erected along with some of the sawmills. In spite of shortage of skilled personnel, a capacity of about 600,000 tons has been developed.

(ii) *Woodware*.—Before the war manufacture of woodware articles such as furniture, tool handles, helves, etc., was being carried on by a large number of people in their homes or in small factories of cottage type. Woodware made in India can be grouped in three classes: (a) Fashioned material like packing cases and crates, furniture, tool handles and helves, bamboo articles including tent poles and bamboo matting; (b) technical equipment like shuttles for spinning, bobbins, reels, spindles, battery separators, etc., and (c) unfashioned articles like poles for electric transmission, telegraphs and telephones, railway sleepers, firewood and charcoal.

During war, production of woodware expanded considerably. Demands for such articles as tool handles, charpoys, hospital furniture, tools chests, packing cases, ammunition boxes and similar military stores were very heavy and articles worth about two to three crores of rupees were purchased by the Supply Department every year during 1942, 1943, 1944 and 1945. War has however, revealed serious deficiencies in India's capacity both as regards quality of workmanship and productive capacity. Woodworking capacity was found lacking in quality and volume as compared with other countries. Indian trade failed to come up to expectations and the Department was forced to establish woodware production at some of the Government controlled sawmills. Lack of kiln seasoning and shortage of skilled labour were two important bottlenecks.

There were large demands for tool handles and helves. Capacity was developed in the Punjab, West Coast and Orissa. Very large indents were received for tent poles (fitted and unfitted) and trade had to be trained gradually and capacity was developed at Allahabad. Air seasoning and kiln seasoning had to be resorted to before packing cases were fabricated. The manufacture of ammunition boxes was also greatly developed at Bombay.

With the industrialisation of the country, the demand for woodware articles is likely to go up though demands for articles like ammunition boxes, etc., has gone down. Development of the industry will, however, depend on experiments and research work in connection with the preservation of woods, chemical treatment, establishment of the seasoning kilns, etc.

(iii) *Plywood*.—The Indian plywood industry was in its infancy at the outbreak of war. During the war it expanded enormously but in a rather unhealthy and haphazard manner and many mushroom factories sprang up. Plywood factories are mostly situated in Assam, Southern India and Calcutta. With the increase in demand, active steps were taken by the Department to encourage plywood production and every possible assistance was afforded to the firms. Special tests were carried out on glues, etc. Machinery was ordered under Lease/Lend and supplied to the needy firms. Assistance was also given in the release of steel, cement and controlled chemicals.

Few well run or well equipped plywood factories exist in the country and even the best of them have not yet attained a standard of efficiency as regards equipment and skilled personnel. The small mushroom concerns have done incalculable harm to the reputation of Indian plywood, particularly with the export tea trade which accounts for a large percentage of the total plywood consumption in India. Apart from the chests which require high quality commercial plywood, the war demands for ordinary commercial plywood in

India were met more or less in full by the Indian plywood industry. There is in particular a great deficiency in the production of the standard size plywood sheet 6 ft. x 4 ft. as few Indian factories have lathes large enough to make these sheets. Drying and pressing arrangements, on which the quality of the plywood depends so much, are still primitive.

India has plenty of good plywood timbers particularly along the West Coast from Kanara to Travancore and also in Assam. Plywood factories exist in these areas, all of which were erected during war excepting two factories in Assam and one in Malabar which existed before the war. Elsewhere the availabilities of suitable timber is less but factories have been erected during war in Bengal, Bihar, Mysore, the United Provinces and the Punjab. Some of these factories are too small and badly situated for raw material to survive while others can only survive by modernisation of their machinery and manufacturing methods.

(iv) *Aircraft timber*.—Even during the first World War, a few airscrews were made of Indian Timber (Padauk) but there is no record to show what actually happened to them. After the first world War, the subject was not pursued. Then desultory experiments were carried on for some years upto 1935 when they became more intensive. During 1942 a contract for production of aircraft timber was given to a contractor and a Government mill at Cheharta (Amritsar) was erected. Some aircraft timber quality was produced, but the experiment was given up.

(v) *Body-building*.—The rapid expansion of the army necessitated a large programme of body-building for vehicles. Body-building was, therefore started at Calcutta, Madras, Delhi and Lahore. The number of bodies supplied increased by leaps and bounds from about 10,000 in 1940-41 to 30,000 in 1941-42 and 40,000 in 1942-43 and in the fifth year of war actual deliveries to the Army and Air Forces approximated to the total of four years' previous deliveries.

Future (Post-war).—The war has made heavy inroads into the timber resources of Europe and Western Hemisphere. The post-war demands for Europe for the reconstruction are likely to be large and little timber is likely to be available for India. India's demand as industrial development proceeds are also sure to be far in excess of those of the pre-war period. There is a demand for better house, better business premises and timber will be required for factories and all these will result in increased demand for good timber, good plywood, press boards and insulation boards. Spectacular uses of wood have been found during war-time. For instance, the wood has been used as a source of motor fuel, lubricants, cattle fodder, synthetic rubber, antifreeze, explosives and a wide variety of other materials.

In construction work, timber has to compete with cement and steel, but it has the advantage of lightness. Heavy demands for timber in the post-war period can only be met by a careful and intensive utilisation of all the available timber and its by-products. Wasteful methods will have to be avoided. The uses of inferior species like Salai started during the war should continue. Wood preservation and wood seasoning will have to be practised. A wood preservation industry is essential, especially in a country like India where there are large quantities of perishable and semi-perishable timbers. Wood seasoning industry will have to be developed on efficient and modern lines. Inefficient factories equipped with poor machinery result in waste of good timber. Modern machinery will have to be imported and personnel properly trained. Imports of tea chests which come to about three millions can be stopped only if the Indian product comes up to the right standard.

There is also a great future for the development of the pressed and insulation board industry in the country. The methods of wood-working trade and standards of its products also need improvement. This industry is, however, bound up with the proper seasoning, preservation of timber and manufacture of good quality plywood. There will be a large demand for sawn timber and the industry can be kept alive by introduction of modern methods of extraction and milling.

Some central organisation is necessary to ensure that timber plays its part in the industrial development scheme of the Central and Provincial Governments. During war Supply Department had had an organisation on timber supply. A Development Officer, Timber, has now been appointed under D. G. I. and S., thus technical advice on problems involved in making the best use of available timber resources will be available to various Governments. New and interesting uses are being developed for forest products and the question of reforestation is quite important and will deserve careful consideration.

CHAPTER LXIII

DRUGS AND DRESSINGS •

1. **Crude drugs.**—In the pre-war period, India used to export annually crude drugs to the value of about two crores of rupees to various countries, particularly England and the United States. A certain quantity of crude drugs was also used by the indigenous drug industry. With the stoppage of shipping and the development of the drug industry in India during war years, a very large proportion of India's production capacity was utilised in the country, but, all the same, considerable exports were also made. Government Medical Stores Depot Factories purchased vegetable drugs to the extent of Rs. three lakhs per annum and about three times the quantity was purchased by the trade, directly or indirectly, for supplies of finished articles to Government. In addition to this, Government purchased pyrethrum flowers and crude opium on an average of Rs. 7 lakhs per year.

The quality of Indian drugs was reported to be inferior in pre-war days as no system of grading existed. A rigorous control of the quality of the drugs tendered both for domestic consumption and export should, therefore, be helpful to establish the reputation of the Indian drug. The crude drug industry in India is capable of further expansion as the demand for certain drugs is bound to increase in view of the large quantities that are consumed domestically.

2. **Tinctures and Galenicals.**—The pre-war production of galenicals was considerable. In 1941, the Government Medical Stores Depot Factories manufactured 175,000 gallons of tinctures for civil and military needs while the trade supplied about 50 to 60 thousand gallons. The present capacity of tinctures is estimated to be about 500,000 gallons per annum. In pre-war days, tinctures were also exported to Ceylon, Federated Malaya States, Burma, East Africa, Afghanistan, Saudi Arabia, etc., but exports dwindled in war-years owing to the increased domestic consumption and scarcity of alcohol.

Alcohol was the chief bottleneck in the production of galenicals, its price having gone up from about fourteen annas per gallon in pre-war days to Rs. 5 a gallon in war years. If the drug industry is to be helped, some sort of relief will have to be given to the manufacturers regarding this in consultation with the Provincial Governments.

The Pharmaceutical Industry in India has developed considerably during the interregnum between the two world wars. The number of chemical works rose from fourteen in 1921 to 38 in 1939 and to 100 in 1944. About 50,000 workers are now employed in this industry. All these firms did well in war owing to stoppage of imports but now unless solvents are made available to them at a reasonable price, many will go out of production. There is no reason why India, with her vast natural resources, should not be one of the principal producers of galenicals, when one considers that in the manufacture of galenicals, complicated equipment is not needed. With the enforcement of the Drugs Act, the quality of the product manufactured is bound to improve and this will help the industry to survive the post-war competition.

3. **Natural Products.**—This is a highly organised industry and is divided into many sub-groups, the important being Opium Alkaloids, Strychnine, Ephedrine, Santonine, Quinine and Caffeine. Opium Alkaloids are produced in the Government Opium Factory, Ghazipore, and their production is a Government monopoly. The pre-war consumption of Morphine was about 500 lbs., and half of it was obtained by imports. The Ghazipore Opium Factory stepped up production of Morphine salts during war years and India practically became one of the mainstays in the supply of these drugs, the production being over 1,000 lbs.

The domestic consumption of strychnine before the war was about 200 lbs. while the present indigenous production is nearly 15,000 lbs., the principal supplier being Messrs. Smith Stanistreet, Calcutta. India used to export only a very limited amount of strychnine owing to the operation of the Strychnine Cartel internationally. The manufacturers will now need some relief in respect of any undue imposition of quota which might be made from abroad.

While the pre-war production of Ephedrine was negligible, the present production of crystalline ephedrine is between one and two tons. India produced about 250 lbs. of Santonine in pre-war days but the present production is nearly 2,500 lbs. The domestic consumption is only 500 lbs. and the balance is exported. The pre-war production of quinine in India was between 50 to 60 thousand lbs. per annum, which was stepped up during the war years to approximately 90,000 lbs. per annum. The production of quinine is almost a Government monopoly, being carried out at the Government Factory, Darjeeling, and the Madras Government Factory in the Nilgiris. The total Indian pre-war consumption of quinine was about 200,000 lbs. of which the bulk used to be imported from Java. The average price of quinine in pre-war period was between 18 to 20 rupees a lb. whilst the present controlled price is approximately 50 rupees a lb. India has enough land available for expanding the production of quinine and it is considered that it should be possible for India not only to increase the production of quinine but also to produce it at a reasonable price under normal conditions.

Caffeine is produced by two firms only—Bengal Chemicals and Smith Stanistreet—on a large scale and the total Indian production now is about 20,000 lbs. This industry will meet serious post-war competition from abroad. Some measures like allowing of inferior tea as raw material instead of tea dust, facilities to put extraction plants and special concessional freight charges from the tea gardens to the place of manufacture, etc., will be of considerable help.

4. Vitamins and Hormones.—Before the war, India was manufacturing practically nothing of Vitamins and Hormones except that certain firms were importing vitamin preparations and putting up proprietary specifics using these as constituents.

The present production of Shark Liver Oil is nearly one million lbs. The Indian fish liver oil is more rich in Vitamin A than Norwegian Cod Liver Oil. The war demands on an average were for 200,000 lbs. of this oil and the civil demand was approximately 30,000 to 40,000 lbs. per annum. There was also considerable foreign demand for this oil. This oil should, it is hoped, be able to hold its own as it has got the natural advantage of having a higher percentage of Vitamin A. The industry has a future if its production is properly supervised. The uncertainty and scattered nature of the catches of fish makes the development of a central factory for the extraction of the oil difficult. The alternative is to educate the fishermen into improved methods of extraction. Centralised refining under the supervision of the Provincial Governments is essential. No oil containing less than a specified amount of vitamin should be allowed to be put on the market.

As regards Hormones, India is now producing large amounts of Liver Extracts, Pituitary Extracts and Adrenaline preparations from animal glands and the total production is estimated at about 12-15 lakhs of liver extract ampoules for injectules. The present production of Extract Pituitary is about 1.5 million ampoules. The production of Adrenaline is now estimated at 5.7 million ccs. per annum of which 1.5-2 million ccs. were taken by Government. Civil demand is estimated at 7-10 million ccs. Indian manufacturers should have no difficulty in maintaining the current level of production and selling their products. Other drugs like Calcium Gluconate amps., Ephedrine amps., Injection Bismuth, Injectio Camphor, Nikethamide, etc., are also produced locally and the total value of these stores purchased roughly came to Rs. 27 lakhs a year.

5. **Essential and Fixed Oils.**—India has abundant raw materials for essential oils and aromatic chemicals and is one of the world's biggest suppliers of fixed oils such as groundnut oil, coconut oil, linseed oil, castor oil and sesami oil. India's import and export trade in essential oils is fairly large and at a rough estimate, about 6 to 8 crores of rupees are involved every year. The following table shows the average imports, exports, and internal consumption of important essential oils in the pre-war period:—

	(In rupees).		Internal Consumption
	Imports	Exports	
			Rs.
Essential oils from grasses . . .	1,000,000	2,590,000	1,650,000
" " leaves, stems, etc. . .	425,000	*	*
" " seeds . . .	342,500	11,565,000	323,000
" " roots and barks . . .	340,000	5,100,000	1,170,000
" " fruits . . .	569,000	*	439,000
" " flowers . . .	1,505,000	*	3,500,000
" " wood . . .	569,000	2,500,000	465,000

*Figures not available.

During war, large demands were placed for various kinds of essential oils such as orange, juniper, clove, eucalyptus, anise, nutmeg, sandalwood and citronella oils. The purchases on account of Government alone averaged between 5 and 6 lakhs of rupees every year. In addition to this, the Supply Department purchased on an average one million lbs. of medicinal castor oil at a cost of nearly 40 to 50 lakhs of rupees. Similarly other oils such as hydnocarp, Santali, sesami and terebinthinae were got in large quantities. The total purchases of essential oils, fixed oils, hydrogenated vegetable oil, etc., by the Supply Department have been nearly about a crore of rupees a year. The industry is not likely to suffer in any way in the post-war period except so far as Eucalyptus oil is concerned. In pre-war period, the entire supply of this oil used to come from Australia as the Indian Eucalyptus oil does not strictly conform to specifications laid down in the British Pharmacopoeia.

6. **Miscellaneous Drugs.**—Production of medicines like Magnesium Carbonate, Magnesium Sulphate, Ponduraras, Bromides, Potassium Permanganate has also been increased as a result of scarcity of imports. The quantities and values are small and even if indigenous production cannot be maintained, it will give rise to no problems.

7. **Scientific Glassware.**—The production of scientific glassware in India was negligible during the pre-war period. No neutral glass used to be prepared in India at all. In war, one firm was able to produce scientific glassware to the

complete satisfaction of the indentors. This firm has two factories at Calcutta and Mayurbhanj. All types of laboratory glassware are now produced in India. The total value of demands for glassware including bottles had been 11.4, 9 and 8 lakhs in 1942-43, 1943-44 and 1944-45 excluding indirect demands for glassware for finished medicines and ampoules. This firm also produced about 100,000 Blood Transfusion Bottles. The Supply Department had an annual demand of, on an average, 10 lakhs of stoppered bottles.

8. **Surgical Dressings.**—Surgical dressings used to be manufactured in India before the war but the war requirements of dressings were out of all proportion to what was required during peace-time. Special types of bandages were required for the Army such as First Field Dressings and Shell Dressings. In 1945 alone a demand of six million First Field Dressings and six million Shell Dressings costing nearly 1.2 crores of rupees was received. In 1945, the total requirements of surgical dressings of the Army came to nearly 53 million yards of various items such as Gauze, Bandage cloth, Wool cotton absorbent, etc. The total purchases of dressings of all kinds and description came to nearly two to three crores of rupees per annum.

CHAPTER LXIV

SURGICAL INSTRUMENTS AND APPLIANCES

In peace-time the surgical instruments industry in India consisted of a number of small manufacturers, the majority of whom were ill-equipped both in machinery and technical personnel for the production of high quality instruments. The products were mainly of the simpler types of instruments and appliances. The Medical Stores Department purchased from these centres such articles as aseptic furniture, sterilisers and simple splints. Most of the complicated appliances and good instruments were imported.

The effect of war conditions rendered the supply of import from U.K. extremely difficult. India was asked to rely on indigenous industry as much as possible. The Indian industry was incapable of meeting the avalanche of demands suddenly placed on it for the Defence needs. The conditions in 1940, were, therefore, chaotic. The first step taken was to appoint a Director of Production (Surgical Instruments and Appliances), whose duties were to formulate plans for the efficient production of instruments. A Technical Adviser was appointed to give technical advice on matters relating to selection of steel and heat treatment and to provide the steel of the correct grade. Considerable confusion also existed as to the patterns and specifications in all branches of surgery. A Committee known as "The Surgical Instruments Standardisation Committee" was constituted. Its important function was to follow the standard schedules of various types of surgical instruments and appliances bearing in mind the need of minimum types and the desirability of selecting types that could be manufactured in India. Schedules of standard instruments for all Branches of surgery were prepared and the number of patterns was reduced to the minimum consistent with efficiency. Another step that was taken was to introduce forward provisioning and central planning of purchase. As a large number of instruments began to come forward for inspection, a special officer was appointed. Thus by June 1942, India became the leading producer of surgical and orthopaedic instruments and a large percentage of equipment for hospitals and operational theatres began to be produced locally. Inspection became the responsibility of the C.G.I. about July 1942 and detailed specifications and drawings of each instrument were prepared. Manufacturers began to experience great difficulty in manufacturing instruments to the new specifications. Up to then, they were working mostly from pictures in catalogues or samples from hospitals. In actual practice hitherto tolerance too had been allowed. Inspection insisted on instruments correct to specifications which resulted in heavy rejections. It was, therefore, decided that suitable technicians should be posted to manufacturing centres to develop manufacturing facilities and supervise production. As some doubt existed concerning the desirability of manufacturing instruments to stringent specifications and as a high percentage of rejections constituted in fact the failure of supply, the Supply Department thought that a decision should be reached whether instruments satisfactory to the Defence Services could be manufactured in India at all. A Committee known as the Grant-Massie Committee was convened in November 1942. The Committee was asked to suggest what instruments should be imported from the United Kingdom, what should be supplied wholly by local manufacture and what could be manufactured in India by specified firms. The Committee was of the view that India could not be relied upon for the supply of all Defence requirements though manufacture of a considerable number of items could be developed by additional equipment and technical supervision. As a result of the Committee's recommendations, the Director of Civil Armaments Production under the D.G.M.P. accompanied by the technical ex-

parts of the D.G.I.M.S. and C.G.I. inspected the centres of production in the Punjab. The responsibility for development was then assumed by C.G.I. who deputed a Control Officer (Surgical Instruments Development) and a staff of technicians to the centres. The Director (C.A.P.) found out capacity required for the manufacture of gauges, fixtures and cutters and also of muffle furnaces, additional equipment required, for plating and the like and also suggested various methods of improving the quality and increasing the production of instruments. They also went into the question of standardisation of components. The resources of the country were investigated and development of firms in Sialkot, Lahore, Bombay and Calcutta was undertaken. The firms were assisted to adopt the heat treatment methods, to obtain necessary machine tools and instructed in the manufacture of forging dies, jigs, fixtures and gauges. Old methods were discontinued. All this resulted in a marked improvement in standard. Hand methods were discontinued and replaced by quicker and more accurate machine processes. Within six months industry was in a position to undertake large orders of good quality surgical instruments. Approximately 30,000 instruments of first quality were manufactured in the latter half of 1949. A Special Officer (Mechanical and Electrical Engineer) was also recruited to give the firms technical advice for production of appliances and to attend to progress of orders. The majority of surgical appliances were comparatively simple in design and did not require very highly skilled artisans to produce them satisfactorily. The firms were able to meet the orders fairly satisfactorily. The purchases made by the Department during 1942-43, 1943-44 and 1944-45 came to about Rs. 7,000,000 per annum.

In pre-war days surgical instruments industry had a reasonably large export trade; particularly to Australia and to a less extent to South Africa. As war demands increased, export from India was restricted. Although the quality of Indian made instruments has improved during war years, they still do not come up to the standard of imported ones. In war-time considerable technical assistance was provided by Government which has now been withdrawn. The Punjab Government are actively considering continuing the technical assistance in some form or the other. Export licences are now being granted to the manufacturers as war demands have ceased. It has been decided that orders for ordinary surgical instruments should be placed on the Indian industry if their products come up to a standard considered satisfactory by the D.M.S. acting in consultation with the C.G.I. The I. and S. Department is to prepare the lists of instruments which should be obtained in India and those which should be imported in consultation with the D.M.S. and C.G.I. The industry, therefore, has a good chance of survival especially if they establish standards and capture the export markets lost by them during war years.

CHAPTER LXV

RUBBER

(a) **General.**—Rubber is vitally necessary for the carcasses of large Army and Air Forces and essential civil direct requirements, for surgical equipment, for certain cements etc. The uses and universality of rubber in warfare can easily be judged from the fact that a battleship uses up as much rubber as is needed for making 17,000 automobile tyres, a 28-ton tank's rubber requirements equal 124 tyres, a 10-ton pontoon bridge 260, a 75 mm. gun carriage calls for 175 lbs. of rubber, and the tyres on a Flying Fortress weigh 100 pounds each—five times as large as the average passenger car.

All the well-known implements of war contain rubber in vital parts. Aeroplanes must have rubber tyres, and the industry was called upon for enormous numbers at short notice. But, in addition, rubber is used in the aircraft's gun-firing mechanism, in its electric cables, oil seals, and engine-mountings, fuel tank-coverings and many other parts. Military tanks contain large quantities of rubber in tyres on bogie wheels, in suspension parts, engines, etc. All classes of ships require rubber in great quantities. Amphibious vehicles, road transport vehicles and gun carriages, are among the greatest consumers of rubber.

(b) **Crude Rubber.**—Rubber is one of the principal commercial products and its commercial importance vies with coal, iron or petrol. The world's supply of rubber comes from Brazil, Malaya, Peninsula, Sumatra, Java, India, Ceylon, Burma and Africa. The total rubber acreage on the 31st December 1940 in India was 137,340 and the production about 15,000 tons.

Rubber became in critically short supply with the Japanese over-running Malaya and the Dutch East Indies. Rubber was, therefore, placed under complete control in India in early 1942 and a Rubber Controller appointed. A Rubber Production Board was created in the latter part of 1942. The task of increasing production was actively pursued and prices were stabilised. The Government of India decided to purchase outright the whole of the rubber crop at fixed prices and undertake responsibility for re-distribution to manufacturers, etc. Other important measures to encourage production were the simplification of grades and the Compensation and Bonus Schemes. In addition to these measures, the collection of wild rubber (*Ficus Elastica*) was also organised from the Assam Frontier Tracts and Ceara rubber from trees growing wild in Coorg. Research and Experimental work on alternative sources of rubber was also undertaken by the Government of India, including a project for the cultivation of 5,000 acres of *Cryptostegia grandiflora* plant rubber which, although giving signs of promise, did not come into production early enough to be worth continuing. Thus India was able in addition to providing a great volume of war requirements and her own civil needs, to make 11,500 tons of rubber available to the Allies.

B.—RUBBER MANUFACTURES INDUSTRY

(a) **Pre-war.**—The manufacture of rubber goods commenced in India about 1920 with the opening of a factory for the proofing of lubrics. About 1923 a factory for the production of rubber covered cables, and in 1928 a State-sponsored factory in Travancore for the manufacture of general rubber goods were established. The real beginning of the Indian Rubber Industry can be said to have taken place during the 1930's when, under the influence of International Rubber Restriction Scheme, rubber exports were restricted by quota with the result that, whilst the world price of rubber rapidly improved, the internal price in India fell thus providing local rubber manufacturers with a considerable advantage.

This, coupled with the comparatively cheap labour available was responsible for the development of the rubber industry in this period. The Bata Shoe Co. began operations in India in 1934; A large factory was established for the production of railway and mechanical rubber goods in 1934 (Indian Rubber Manufacturers Ltd.); a tyre factory was established in Bengal in 1935/36 [The Dunlop Rubber Co. (India) Ltd.]; and another in Bombay in 1939/40 (The Firestone Tyres and Rubber Co., of India, Ltd.). In addition, a large number of small factories came into being for the production of rubber footwear, but only two or three for general rubber goods items such as hose, sheeting, cab tyreing, moulded goods, etc., and one or two for the manufacture of cycle tyres and tubes on a small scale.

The principal raw materials used by the Rubber Industry are rubber and cotton, carbon black and other chemicals such as zinc oxide, litharge, glycerine, barite, rosin oil, graphite, shellac, solvent oil, factice, casein, bead wire, etc., etc.

(b) **War-time.**—Upto the outbreak of war, South India was producing about 15,000 tons per annum and 3,000 tons were being imported from Burma. Of this Indian manufacturers consumed some 12,000—13,000 tons per annum and some surplus was available for export. The outbreak of war, however, entirely changed the prospect. The maximum rubber which could be produced during war-time—even by destructive methods of production and special compensation for the planter as stated above was about 19,000 tons which was barely sufficient during war-time. Including re-claim, India was hardly self-sufficient. The use of rubber, therefore, was prohibited or curtailed for the manufacture of unessential goods, viz., footwear, sports goods, clothing, domestic appliances, etc., and the production and distribution of mechanical and industrial rubber goods for essential purposes were regulated. Rubber was also substituted in a great many manufactures. A Rubber Goods Manufacture Control Order was issued on 1st April 1942 under which use of rubber for all unessential goods was prohibited.

With the loss of Malaya, Java, Sumatra and Burma in 1942, India had to rely on her manufacturing facilities for essential rubber goods like tyres, mechanical and water-proof sheetings, rubberised fabrics, hose of every description, ebonite and moulded goods, etc. The development of many of these items was stimulated by the restriction placed on the manufacture of other non-essential rubber items, such as rubber footwear for civilian use, sports goods, etc., and many of the factories previously occupied in producing foot-wear were expanded and developed for the production of these general industrial and mechanical rubber goods. This industry was however, in general, not soundly based as most of the plant is improvised or obsolete, and the majority of the goods produced do not come up to the imported standard although there has been a steady improvement in quality.

The tyre production increased considerably and the two plants (of the Dunlop and Firestone Companies) have been substantially expanded to meet war demands, the main addition being in respect of 200,000 giant tyres of special sizes required for the army. The present capacity of both the companies in respect of motor, truck and cycle tyres is more than 8 millions. Controls had to be imposed during war-time to regulate manufacturing programmes, selling prices and the sale and acquisition of tyres and tubes. Control of programmes was on the basis of a quota agreement between the four companies in accordance with which they were licensed for the manufacture of tyres against the civil quotas. Government took about 60 per cent. of the production of Commercial size tyres and the entire output of special army sizes and aero tyres and also 90 per cent. of the output of other rubber goods. Rubber and chemicals required for tyre and other manufactures were released by Gov-

ernment. Capacity for the production of special sizes and aero tyres was built up partly with Government assistance, Government providing the plant and machinery, formers and moulds and the companies providing the buildings and services. The price basis agreed to was estimated cost plus a percentage for profit with provision for the consideration of frozen profit agreement after a year. Similar agreement was concluded in regard to British and American Aero Tyres and Tubes. Government Retread/Repair Plants were installed at Calcutta, Delhi, Bombay and Madras and were operated on behalf of Government by the tyre companies. The unserviceable tubes and the rubber removed from the remaining unserviceable tyres were despatched from the Government Scrap Rubber Depots to the Government Reclaim Plant for the manufacture of reclaim rubber.

The encouragement of production of rubber-covered cables was another hearty development due to war emergency. The present capacity of the only two firms (Indian Cable Co. and the National Insulated Cable Co.) is 900 tons per annum. War-time controls extended over manufacturing programmes, distribution and prices. The production of footwear (rubber-soled canvas footwear, rubber soles and heels, gum boots) also received a great stimulus and capacity of the industry expanded considerably. The present capacity of Indian Industry is more than 15 million pairs per annum. At present there are more than 115 rubber manufacturing units located mostly in Calcutta and Bombay and to a small extent in Sialkot (Punjab). Under the war stimuli, the production of nearly every class of rubber goods has been established and at present India is virtually self-reliant for all requirements other than certain types of rubber belting for industry purposes. Excluding tyres and cables, supplies of these manufactures against war order in 1945 alone amounted to Rs. 35,000,000, the great bulk of which was for items not previously manufactured in India. Apart from general industrial items, special items produced against Defence Services demands included aircraft tyres, ground sheets, battery boxes, pontoons, river crossing equipment, life belts, self-sealing hose, petrol resisting hose, specialised water-proof clothing, jungle fighting boots, flame throwing equipment, surgical goods, meteorological balloons and numerous other items.

Post-war.—The present capacity of this industry is in fact greatly in excess of any conceivable post-war requirements. Indian Industry has to face foreign competition, especially from the U.S.A. and the U.K. Now that the Rubber Restriction Agreement is in abeyance, the Indian manufacturers will have to pay approximately the same price for rubber as others which will mean that the Indian Industry will now be faced with greater difficulties than in the pre-war period. If the industry is to survive, the quality of products and machinery will have to be improved. The industry also suffers from lack of skilled labour. It will require assistance in regard to getting capital goods from abroad, training of Technical personnel, etc., Standards will have to be laid down. The question of protection to some sections of industry is being investigated by the Tariff Board. The question of manufacturing simple machinery required for this industry in the Ordnance Factories is also engaging the attention of Government.

The Rubber Control and Production Order, 1946 (which repealed the old Order of 1942 on the termination of the purchase of rubber by the Government) expired on 30th September 1946. The rubber industry is anxious about its future and any continuation of the present uncertainty will tend to reduce production. A recent source of difficulty to the producers of natural rubber will be the "synthetic" variety. It is in the national interests to ensure the production of natural rubber in this country.

Recently a conference was held at Coimbatore, at which the future of the Industry was discussed by representatives of producers, dealers, manufacturers, Central Government and of the Governments of Madras, Travancore, and Cochin. It was held by an overwhelming majority that on the termination of the Rubber Control and Production Order, a statutory organisation, Indian Rubber Board, should be set up to look after the interests of the rubber producers in India on the lines of the Indian Coffee Board. Its functions *inter alia* will be to take steps for the efficient marketing of Indian rubber, advise Government on imports and exports, recommend fair prices, promote research and, in short, do all such other things as may be necessary for the development of the industry. Government have taken the necessary legislation in hand.

CHAPTER LXVI

CEMENT

1. **Pre-war.**—The Indian cement industry is hardly 30 years old but among Indian industries it stands out in enviable distinction as an industry with a highly centralised organisation. Portland cement was first manufactured at Madras in 1904 but the foundation stone of the present industry was not laid down till 1912. In 1914 two companies were producing cement up to the requirements of the British Standard Specifications. The output was small. The first World War gave a stimulus to the industry and the then existing firms increased their plants. During war the production of cement factories was controlled but with the cessation of hostilities, Government control was removed and thereafter ensued years of comparative industrial prosperity when the industry expanded its output and the prospects attracted the flotation of new companies. The spate of expansion, however, was followed by a slump. In 1924, the industry was in a bad way due to overproduction and a rate war which led to price cutting amongst the various companies to such an extent that prices actually fell below production cost and several companies went into liquidation. The industry sought protection and the Tariff Board appointed by Government recommended a scheme of conditional bounties. The recommendation was not, however, accepted by Government and the industry was thrown back on its own resources. A Cement Marketing Company of India was ushered into existence to take over control of the sales and distribution of all the manufacturing companies. The manufacturing companies formed a pool known as the Indian Cement Manufacturers' Association. It was an uphill task to secure markets for the excessive output of these factories. So a year later, the Concrete Association of India was formed with the object of educating the public in the use of cement and providing free technical aid and advice. Later on it was felt that a complete fusion of manufacture and sales was essential to enable the industry to continue its declared policy of bringing the price of cement within the reach of everyone throughout India. On 1st August 1936, an Associated Cement Companies Limited, came into existence with the primary object of making and delivering cement as cheaply as possible so that it might be able to hold its own against any possible internal and foreign competition.

The cement consumption gradually expanded and imports declined. While in 1924 the consumption was 388,000 tons, in 1936-37 it was over a million tons and imports during the same period declined from 124,000 tons to 88,000 tons.

When the second World War broke out, the industry was well-established. Its production was 1,538,000 tons, controlled by five companies—the Associated Cement Companies Limited, Bombay; Dalmia Cement Limited, Dalmi-nagar; the Assam Bengal Cement Company Limited, Calcutta; the Sone Valley Portland Cement Company Ltd., Calcutta and the Andhra Cement Company Limited, Bezwada.

2. **Development during the second World War.**—War brought forth increased demand for military construction and production had to be stepped up. Most of the factories were already working on a 24 hours basis for an average 350 days in a year and so increased production was secured by the expansion of plant and equipment and not by working more shifts. In early years of the War, large quantities were also exported to Malaya, Java, etc.

Cement deliveries from works for aerodromes having not been up to expectation, the Government of India instituted a control over the entire production of cement in order to ensure appropriate and economic distribution among consumers. An Honorary Cement Adviser was appointed to assist the Central

Government in collecting and collating necessary information and to advise the Government of India on all problems relating to the control or regulation of the production, distribution and use of cement. To effect a better and more economic distribution of the civilian quota, eight Honorary Regional Cement Advisers were appointed at important centres like Bombay, Calcutta, Lahore, Madras, Cawnpore etc. A Cement Panel having representatives of E-in-C, Railway Board, etc., was formed to advise the Department on problems connected with the production and distribution of cement. A Consulting Engineer (Cement) was appointed to advise the industry on technical side and to effect improvements in the methods of production. He was a sort of friend, philosopher and guide to the cement factories. Coal and transport problems affected the cement industry like all other industries. Before the war, cement factories consumed about 70,000 tons of coal per month. The situation became critical about October 1943 when coal quotas were allotted to all industries. The quota generally fluctuated between 60 to 65,000 tons.

3. **Cement contracts.**—The Government off-take in 1942 and 1943 was as much as 90% of the total output. It has been reduced gradually; in the year 1944 it was less than 75 per cent and in 1945 about 30%. For the year 1st November 1942 to 31st October 1943 the contract provided for payment of fixed prices. From 1st November 1943 it was decided to fix the prices of cement with each supplier at their cost of production and a fixed rate of profit per ton. A cost examination was to be carried out to ascertain the increase in costs due to escapes provided in respect of operational wages, material and overheads in the previous quarter and the actual cost thus ascertained was to be the fixed cost for the current quarter. The price agreements for 1944-45 and 1945-46 were to take the same form.

4. **Post-war (Future).**—(a) *Expansion projects.*—Various cement companies have been working on big expansion projects. These expansion projects have been examined by the Reconstruction Committee of Council which agreed to the following expansions:—

- (a) The Associated Cement Companies Limited should be permitted to extend their existing works and to build new works with a total capacity of 11.5 lac tons; and
- (b) the Dalmia Group should be permitted to extend their works with an additional capacity of 6 lac tons.

Further the Committee decided the following new projects:—

- (i) Shree Digvijay Cement Company should be permitted to erect a new factory in Jamnagar State with a yearly capacity of one lac tons; and
- (ii) that 1.15 million tons should be reserved for 'outsiders' and newcomers. Most of this quota has also now been allotted. Schemes of new factories for some States like Sirmoor, Tehri, Garhwal, Bhopal have also been approved.

The above firms have been taking necessary action to implement their expansion schemes and they are well on the way.

(b) *General.*—The cement industry is one of those few industries which may look forward to the future with complete confidence in its continuing prosperity. The capacity of 200,000 tons will be readily absorbed by the market. Pent-up civilian demand and the requirements of the Far Eastern countries for reconstruction purposes should account for a big off-take, while any quickening of the pulse of industrialisation will lead to increase in cement consumption as more factories and buildings of all sorts are put up. The extension of social services involving the erection of many medical and educational institutions, etc., should help to sustain the war-time increase in the productive capacity of the cement industry.

The demand for new types of cement such as low heat cement, water repellant cement, plaster cement, etc. may also increase after the war. It is likely that changes in regard to localisation may take place depending on the discovery of new deposits of raw materials and marketing conditions. The raw materials serving the existing factories are adequate.

ASBESTOS CEMENT PRODUCTS

The allied line which consumes a fair quantity of cement is Asbestos Cement Industry. The main raw material is asbestos, a term which embraces a number of minerals all of which can be split into fibres capable of being spun or felted together. India has to depend on imports of asbestos fibre. Asbestos is found in many parts of India like Cuddapah in Madras, Seraikala State in Bihar and Hassan and Bangalore Districts in Mysore, but none of these sources have been developed to any great extent, nor do they supply fibres of good quality.

Even before the war the Asbestos Cement Limited, Bombay, had a factory in each of the three provinces—Central Provinces, Bombay and Bengal. Indian cement has always been used in all the factories. The main products were roofing and building sheets, building pipes, accessories, gutters, etc. On the eve of the war, due to the competition of imports, Bombay and C.P. factories were not working to full capacity while the Calcutta factory remained closed.

The war gave a fillip to the local industry because of the cessation of imports from countries like U. K., Canada, Belgium, Italy and Japan and led to an increase in Indian production. The output of the three factories rose to 6,600 tons per month and generally 70-80 per cent was taken up by the Government Departments including Defence Services. The pre-war capacity was 2,000 tons per month.

The future demand of asbestos cement products is difficult to estimate, as asbestos cement is a product which competes with a number of equally suitable building materials, such as galvanised iron sheets, cast iron pipes, etc.

The pre-war consumption of asbestos cement products in India was approximately 12,000 tons per annum. The present consumption is probably about 20,000 tons, but it is expected to increase with building activities.

The existing industry has a capacity of 80,000 tons per annum. The three existing factories are at Calcutta, Kymore and Bombay and as freight and breakage during transport increase the cost of asbestos cement products considerably, it would appear that two or three new factories could be established in India without damage to the existing works provided geographical location is taken into account. There appears no danger of the industry being adversely affected by foreign competition.

CHAPTER LXVII

GLASS

1. **Introduction.**—The manufacture of glass was carried on in olden days as a cottage industry in many parts of India, especially in the Punjab, Bihar, Bengal and Bombay Presidencies. Articles like bangles or churi, bottles, flask, lotus, flower-vases, etc. were manufactured. Glass was manufactured from "reh" sands and quartz. Furnaces used were crude and old fashioned and wood fuel was employed. Manufacture of glass on modern lines started from the nineties of the last century. Of the factories established some failed owing to lack of an efficient organisation, inadequate technical skill, improper location etc. and about 1914, only a few factories were in operation.

2. **Development during the first World War.**—During the first World War the Indian Munitions Board encouraged the manufacture of glass-ware in India, and about 1918, 20 factories were producing glass. The glass manufactured was very soft obtained by the use of a considerable proportion of alkali. Besides there were many factories in Ferozabad where bangles were manufactured. About 1920, attempts were made to construct muffle furnaces in which glass could be successfully melted on to the bangles. Stimulated by the demands for specialised forms of glass passing through the Indian Munitions Board, several factories, with some degree of success, turned out glass tubing, flasks, beakers, petri dishes and test tubes of non-resistant glass. In short, the character of the industry underwent great changes during the first World War.

3. **Condition from 1918-1939.**—With the end of war in 1918, the indigenous industry suffered a severe set-back and found it difficult to make headway against foreign competition from Japan, Italy, Austria, Germany and other European countries. To protect the industry import duties of 30 per cent on glass bangles and beads and false pearls, and 15 per cent on glass and glassware were imposed in 1923. The industry again clamoured for protection and during the period (1923 to 1932) the duty on imported glass was increased from 15 per cent to 30 per cent and this gave a further stimulus to the industry with the result that 22 new factories were established during the period.

4. **Condition when the second World War broke out.**—The annual production of glass and glassware before the war was of the value of Rs. 2 crores. The total imports in 1938-39 came to Rs. 1.25 crores. In 1938-39, the Indian production was only able to meet 60% of the total estimated demand. Some exports were also made chiefly to Burma, Ceylon, Iran etc.

Indian industry could be divided into two welldefined categories:—

(1) **The indigenous Cottage Industry.**—The artisans in villages purchased the glass blocks or cakes manufactured by the modern types of glass factories and made out bangles in small furnaces in their homes. Such cottage industry was to be found particularly located in the district of Ferozabad in United Provinces and in the district of Belgaum in the south of Bombay Presidency.

(2) **Modern Factory Industry.**—The modern factory industry was still restricted to the production of the following classes of glass goods: (a) Glass cakes for bangles; (b) Beads, bottles, lampware, phials, table-ware etc. (c) Factories which were run on extensive scale, produced the sheet and plate glass; and some factories started manufacture of surgical and laboratory requirements in glass.

In 1938-39 there were a hundred and one factories most of them being in U. P., Bengal and Bombay. The three chief materials used are soda ash, sand and lime (or limestone) which form 33, 67 and 10 per cent of the raw material cost.

5. Developments during second World War.—In war the Supply Department placed substantial orders with the local glass factories and the industry has rendered highly useful service to the defence of India.

Hollow-ware.—A remarkable expansion has taken place in this branch of the glass industry, which is producing articles like tumblers, lamps, globes, hurricane chimneys etc. Within two years nearly all factories made a fundamental improvement by the change-over from old-fashioned pot furnaces to tank furnaces or to modern pot furnaces, and the melting of glass has been simplified and made cheaper. The use of jar-making machines and finishing machines was also introduced on Government initiative.

Sheet Glass.—The Glass Works at Bahjoi (United Provinces), the only plant of its kind in Asia, had been producing window panes before the war. During the war production of window glass expanded from 1,000 tons to 5,500 tons per year. The same firm has started another sheet glass factory at Kandra equipped with a plant of higher production capacity imported from the United States of America with Government assistance. The Allahabad Glass Works, Naini, also manufacture a type of rolled window glass of the "Cathedral" type, similar to sheet glass, with figures embossed on them.

Bottles.—Bottles manufacture was less developed than other branches of the glass industry and indigenous bottles had great difficulty in competing with imported ones, especially due to their irregular capacity, poor finish, unsuitability for mechanical closing and insufficient chemical and mechanical resistance. As a result of impetus provided by the war, several factories having modern equipment such as tank furnaces and semi-automatic machines have been established. The Vibhuti Glass Works, Limited started a factory at Ramnagar (Benares State). This factory also manufactures screw nut bottles. Capital Glass Works, Limited started a factory at Ghaziabad having a capacity of about 2,000 tons for the manufacture of better glass table-ware and bottles.

Fancy goods.—Fancy goods such as glass buttons, pendants, animal figure beads, etc., are made on a cottage scale in several towns of the U. P. The manufacture of glass pearls and beads is a recent development.

Scientific glassware.—No scientific glassware had ever been produced in India nor wares made of neutral glass. The production of neutral glass which was confined to Central European countries, was a closely guarded secret. An Indian firm, however, took the initiative, did research work and produced neutral glass of very good quality. Such glass is required for strong medicines, injectules, biological products, etc. India is also producing a large variety of laboratory glassware such as burettes, pipettes, beakers, flasks, petridishes, desiccators, etc.

Glass bulbs.—A new development is the production of glass bulbs. Indigenous production was developed by Ganga Glass Works, Balawali, and Kaycee Glass Works, Shikohabad, by erecting modern pot furnaces and with Government assistance.

7. Recent technical developments.—Steps have been taken for the installation of modern equipment in some of the factories. Modern furnaces and new machines have been introduced with the result that the cost of production in the local factories has been considerably reduced. New lines of glass products such as glass beads, false pearls, ornamental glass plate, tubes, pipes, windolite (substitute for glass for building purposes) have also been developed. As a result of the encouragement, advice and technical direction provided by Government, the local industry has now developed a new product known as the windolite which is a substitute for glass to be used for building purposes.

The furnace is of primary importance in the glass manufacture and development on modern lines has been effected during the war period so as to obtain higher temperatures with economic use of coal, and to obtain correct

temperature for fusion and melting of quality glass. In order to stimulate a quick adoption of modern glass melting furnaces, designs of furnaces were acquired from abroad and their actual construction was subsidised. Nearly all the factories have made a fundamental improvement by the change-over from old-fashioned pot furnaces to tank furnaces or to modern pot furnaces. The furnace developments have been mostly in the direction of recuperative and regenerative furnaces. Improvements in moulds and in technique have also been obtained through the technical advice of Government Glass Technologist, U. P. as well as by obtaining glass experts from foreign refugees. These technical developments have resulted in production of superior glass on a large scale and at a cheaper rate due to higher temperatures now obtained in the furnaces.

8. Post-war.—The new developments can be continued and civilian goods manufactured, though certain adjustments for conversion from war to peace will be required. The glass industry has several sub-branches each branch having a more or less defined minimum working unit. In bangle industry, small scale is the optimum scale but in hollow-ware industry, only mass production is profitable. The glass industry is scattered all over India though most of the factories are in Bengal, U. P. and Bombay. The industry has had to pass through hardships such as restricted supply of chemicals, coal, difficulty of transport etc. The quality has left much to be desired and in future improvements in quality and finish will be necessary. Raw materials are available. If the industry is to maintain the progress, it must keep itself abreast of the times. Most of the articles now produced are of a common type. Attempts should be made to produce special articles such as optical glass, toughened glass, plate glass, fibre glass etc. Facilities for research and for the training of suitable personnel are indispensable for the industry's future. Central Glass and Ceramic Research Institute is being established at Calcutta, and should go a long way to meet this need. The industry has developed in recent years in a haphazard fashion and rationalisation will be necessary. At present there are about 200 factories out of which about 170 are in U. P. The potential capacity of the industry is much greater than the actual production. If the coal is available, the industry could consume 20,000 tons per month, though the allotment during war-time has been only 6,000 tons. The industry will also have to reckon with foreign competition and some protection may be necessary.

As the consumption of glassware increases with the advancement of civilisation, the future of the industry is assured provided it improves its methods, produces more respectable and better articles and a variety of goods. The industry can expand and manufacture articles previously imported into the country. Fortunately for India, resources of raw materials required for the glass industry abound in this country and so all that is needed to ensure a speedy development of this industry during the post-war period is enterprise. It is up to those who are engaged in the line to prove that they have this enterprise.

CHAPTER LXVIII PAPER INDUSTRY

The commercial future of the Indian paper lies with the machine. The first paper mill on European lines was opened in India in 1716 at the Danish settlement of Tranqubar in the Tanjore District mainly for the purpose of supplying paper to the printing press opened by the Mission at that place. Later on several other paper mills were established. When the first world war broke out, the total Indian production of paper was about 13,000 tons, but the industry was in a bad state and almost all the mills were under-sold. The war did give some stimulus but it was short-lived. After the war, the production fell considerably and while the highest output of paper recorded in 1916 was 31,000 tons, it dropped down to 23,586 tons in 1942. The industry was in a very shaky condition. Owing to the difficulty of securing an adequate supply of wood-pulp and paper during the war, the Indian paper mills were forced to make a greater use of sabai-grass as a paper material. On the whole, however, after the first world war, it seemed that the paper industry had attained a fair amount of success and the future prospects appeared to be promising. Concurrent with the increasing imports from abroad, the indigenous production was also increasing. The difficulties at that time which beset the industry were the high cost of raw materials and the depreciated currencies.

In order to protect the industry, the Government of India constituted a Tariff Board in 1924 and on their recommendations levied a duty of one anna per lb., on all writing and printing paper other than newsprint containing 65 per cent. or less of mechanical wood-pulp. As the duty levied in 1925 expired in March 1931, another Tariff Board was appointed. The important recommendations made by the Board were that the withdrawal of duty would seriously cripple the Indian industry; a direct incentive should be offered for the manufacture of paper pulp and duty on imported pulp should be fixed at Rs. 45 per ton and a Paper Pulp Section should be set up at the F. R. I. Dehra Dun.

When the second World War broke out, the position briefly was that the industry was struggling against intense foreign competition. This fight was undoubtedly an uphill task for the industry but that it was making considerable headway is borne out by the fact that between 1925 and 1939 the total production per annum increased from about 13,000 tons to about 60,000 tons. This production was largely limited to the more common varieties of printing and writing papers and common wrapping papers and was round Titaghur, Bengal, India Paper Pulp, Upper India, Couper and Deccan Paper Mills. Just before the war several other mills were started including Rohtas, Orient, and Star, and Shree Gopal was re-opened.

Like the cotton textile industry, the paper industry has had a boom period owing to the difficulties in securing supplies from abroad and to complete cessation of imports from the Northern European countries. But mills could not be possibly built up overnight due to many limiting factors the chief of which was the non-availability of requisite machines, raw materials and chemicals. But undoubtedly the war which led to the virtual cessation of imports came as a blessing in disguise to the Indian industry. Owing to reduction in imports and tremendous increase in demands, it was imperative that the indigenous production should be developed. The Indian manufacturers rose to the occasion and production rose from 59,197 tons in 1938-39 to 103,883 tons in 1944, inspite of the shortage of coal and other handicaps, viz., transport, raw materials, lack of machinery and skilled labour.

Government took several measures to assist the industry. Originally in 1941, the C. P. & S. was the authority concerned with the purchase and supply of paper

and all printing and stationery stores. The Supply Department was only the procurement authority while the development fell within the sphere of the Commerce Department. In 1943, it was decided that only one authority—the C. P. & S.—should be responsible for the procurement of all products of paper mills in India. The Commerce Department and later the I. & C. S. Deptt. was made responsible for development. A Paper Production Commissioner was appointed who advised Government and assisted the industry by giving technical advice, etc., to manufacturers. In 1944, it was felt that to leave the responsibility with too many departments was not conducive to efficiency and it was decided to transfer the development, procurement and production to the Supply Department. Measure to restrict consumption, distribution, price control, etc., were still the responsibility of the I. & C. S. Deptt. A Paper Directorate with technical staff was established in the D. G. Supply to deal with the problems of development, procurement and production.

A Paper Conference was held in September 1942 which recommended the concentration of paper production on a minimum number of varieties and restriction of production in each mill to these varieties and also that efficient supplies of raw material, particularly chemicals, should be made available. The Paper Production Commissioner visited the paper mills and arranged for an agreed plan of production in each mill in accordance with the Conference recommendations. Every possible assistance was given by the Paper Directorate, e.g., release of raw materials, transport, technical advice, etc.

A Paper Control (Production) Order, 1944, was brought into force on the 2nd August, 1944. It restricted the production of paper boards, etc., to certain specified varieties. The circumstances necessitating the introduction of this control were that some of the paper mills attempted to evade the price control of the I. & C. S. Department by manufacturing qualities of paper slightly different from those to which the ceiling prices applied and because it was felt that by limiting production to certain specified varieties total production could be increased.

The production of paper during 1945 rose to about 105,000 tons. The production, however, has not been achieved without the lowering of the standard of qualities of production. The result of the war-time reduction in quality has been that to-day the paper consuming public is more appreciative of the quality of paper and is in fact impatient for the time when better quality paper will once again be available. This is a most important point for serious consideration because in future, it will not only be the price alone that will bring business to paper mills but also the quality of their production. Expansion of the industry will have to be enormous. The present potential capacity of the industry including strawboards is 140,000 tons and working on a most conservative basis, an increase of 30,000 tons will be required in the existing capacity.

If the industry is to develop on sound lines, the future planning of the industry should take the following lines:—

(a) Some control should be exercised over the erection of new mills and expansion of existing ones to ensure that the industry is not developed haphazardly.

(b) Some de-centralisation is indicated. At present industry is concentrated in Bengal. There are areas which offer considerable difficulties as regards water and raw materials.

(c) New Mills should have a production of at least 8 to 10,000 tons as smaller units are likely to prove uneconomical.

(d) Erection of a couple of additional mills with a production capacity of 10,000 tons per annum for straw boards—one at Calcutta and other in South India—should be considered.

(e) Special varieties such as grease proof, vegetable parchment, newsprint, etc., should be given careful consideration.

(f) Each mill should send one or two persons for intensive training in paper production and experience in foreign countries. This will provide a number of technicians necessary for the modernisation of the industry. Simultaneously vocational training should be started.

CHAPTER LXIX

FERTILISERS

Introductory.—Closely linked with the heavy chemical industry is the manufacture of chemical manures commonly known as artificial fertilisers, chief of them being nitrogen compounds and superphosphates. The food of plants consists of certain mineral salts like compounds of nitrogen, phosphorus and potassium in forms easily assimilable by plants for their growth. These salts are present in ordinary soils to some extent, but the fertility of virgin soil gets exhausted by cultivation over long periods of time. Indian soils are deficient in nitrogen and phosphates due to the inadequacy of manure and the soil erosion caused by heavy rainfall. Various experiments conducted at Pusa, Madras, Bihar and Burma have shown that the use of phosphates and superphosphates greatly increased the yield of all crops, particularly of paddy.

But the quantity of fertilisers used in India is negligible and the yields of Indian crops are very low, being usually a fourth of what are obtained in other countries. Even a small and industrially backward country like Egypt uses 233 lbs. per acre as against India's 0.61 lbs. per acre and gets a yield of 3,000 lbs. of rice per acre as against 820 lbs. in India. Korea, Japan and Italy are obtaining still higher yields, four to five times those of India. This is true also of other food crops like wheat and of money crops like tobacco and groundnuts and fibre crops like cotton. Out of India's total requirements of 55 million tons of foodgrains, she depended on imports from Burma to the extent of only 1.4 million tons. The increased requirements for the fighting forces in war time came to another 500,000 tons. Thus the gap between production and consumption of foodgrains, due to war, was only about two million, i.e., less than 4 per cent. of the total normal production and if good use had been made of fertilisers, bridging this gap would not have been as difficult as it proved to be.

The two important fertilisers are superphosphates and ammonium sulphate. The production of superphosphates in India at present is spasmodic and dependent on the availability of sulphuric acid. About 2,000 tons of superphosphates produced from bones, horns, etc., may be put down as a rough estimate. Ammonium sulphate is produced and consumed in greater quantities. This is the fertiliser best suited to Indian conditions and neither ammonium nitrate nor Urea and ammonium chloride can be used with advantage in Indian fields. Ammonium nitrate possesses certain properties which militate against its direct use. It absorbs moisture from the air, leading to losses and serving caking troubles, especially in damp weather. It is liable to decompose, sometimes explosively. It is, therefore, not suitable for use as a fertiliser without admixture with some other material which facilitates its storage, handling and application to the soil. In drier countries, it is possible to use ammonium nitrate as a fertiliser when mixed with ground chalk or limestone and attention has recently been given to the development of methods of coating the crystals with resins and other materials with the object of overcoming the caking difficulty. The only nitrogenous fertiliser to be extensively used suited to Indian conditions is the sulphate of ammonia.

Ammonium sulphate.—Sulphate of ammonia may be described as a nitrogenous fertiliser in which nitrogen, in the form of ammonia, is combined with certain elements to produce a compound which can be readily handled and applied to the soil. Its manufacture is a highly technical subject and falls into two stages:—

- (i) the production of ammonia itself; and
- (ii) its conversion into sulphate.

Ammonia is a compound formed from three volumes of hydrogen and one volume of nitrogen and its manufacture consists in producing a mixture of the two gases

in the correct proportions in a high state of purity and causing them to be combined. The important methods for its preparation are (a) manufacture of ammonia from by-product hydrogen; (b) from coke-oven gas; (c) from natural gas; (d) from electrolytic hydrogen; (e) from hydrogen produced by action of steam on carbon; and (f) from hydrogen produced by the steam-iron process. The best method suitable for India is the production of ammonia by the semi-water gas process using Bihar coke which is available in sufficient quantities.

There are two methods used in the conversion of ammonia into sulphate of ammonia, viz., (a) the sulphuric acid process and (ii) the gypsum or anhydrite process. The first method is not suitable to India since it requires sulphuric acid which would have to be manufactured from imported sulphur. The chief raw materials required for the second method are ammonia, gypsum and coke. Ample quantities of gypsum and also some anhydrite exist in India and, therefore, this process is the best for India for the conversion of ammonia into sulphate of ammonia.

The total pre-war consumption of ammonium sulphate in India was only about 100,000 tons a year, more than half of which went to sugar cane, coffee, tea, and rubber plantations. The quantity used for food crops like rice and wheat was thus relatively small, and the food crops were totally denied this important fertiliser on the cessation of imports during war as the Indian demand was met largely by imports. The indigenous production was negligible. The pre-war production and import figures are given below:—

	(In tons)	
	Imports	Production
1936-37	59,000	22,300
1937-38	64,100	10,500
1938-39	76,000	15,000

The main countries were the United Kingdom, Germany, Netherlands, Belgium, Japan, U. S. S. R. and the United States.

The developments of the war, curtailing as they did imports of rice from Burma, coupled with a bad harvest and the destruction of crops by cyclone and floods in Bengal in 1942 brought to the forefront the problem of food. The "Food Grains Policy Committee" as well as the various Food Conferences came to the only possible conclusion, namely, that at least 350,000 tons of ammonium sulphate a year should be immediately available for increasing the production of food crops in the country. A conference of industrialists and representatives of Government Departments was held in September 1943 under the Chairmanship of Hon'ble the Supply Member to tackle the problem. The Conference confined itself to a short term programme for the production of 350,000 tons of ammonium sulphate. Supplies of farm yard manure and night soil of towns converted into manure by the hot fermentation process (composting) would be sufficient for the cultivation of vegetables but not for the production of foodgrains. Of the two alternative sources, viz., imports and indigenous production, the Conference came to the conclusion that while shipping space would not be available for such a large quantity of ammonium sulphate, it will be available for importing the necessary plants

from the U.S.A. to set up production in India. This recommendation was considered in detail by the Government of India who thought it fit to obtain the advice of an Expert Committee on the subject. A Committee of two Experts—one from the Imperial Chemical Industries Limited (Mr. G. S. Gowing) and the other from the Power Gas Corporation Limited—was accordingly invited to India with a view to exploring the possibilities of the manufacture of this quantity of ammonium sulphate. Various experts in India were also invited and a survey of raw materials available, particularly gypsum, was made. The Fertiliser Technical Mission arrived in India on the 10th June 1944. The Mission was asked to—

- (i) investigate and report to the Government of India on the technical problems involved in the manufacture of sulphate of ammonia in British India in quantities up to 350,000 tons per annum;
- (ii) recommend the most economic method of manufacture;
- (iii) indicate the approximate capital cost of the plant or plants to be installed and calculate the approximate cost of operations and production of finished sulphate of ammonia;
- (iv) recommend the most suitable site or sites for the erection of the plants concerned, taking into account the raw materials available and the most economic distribution of the finished products;
- (v) estimate the amount and approximate value of plant which will be necessary to import from abroad;
- (vi) consider and recommend the most economic method of manufacture of any alternative fertiliser other than sulphate of ammonia; and
- (vii) estimate the capital and operating cost of manufacture of such alternative nitrogenous fertiliser.

Prior to the arrival of Mission in India, the Government also appointed a Consultative Committee to meet the Mission in Delhi for preliminary discussions and examination of the Statistics and information which had been collected to assist the Mission in their investigation. The Committee was headed by Sir James Pitkeathly, Officer on Special Duty, Department of Supply.

The Mission submitted its Report on the 2nd November 1944 and recommended—

- (a) the most economic method of manufacture is that of employing water-gas made from coke to produce the necessary ammonia, followed by conversion to sulphate by the gypsum or anhydrite process;
- (b) the most economic scheme is that in which the whole production is carried out in a single factory. The approximate capital cost of such a factory was estimated to be Rs. 10.1 crores and approximate cost of the finished product to be Rs. 114 per ton at the factory;
- (c) the best site for such a factory is in the Gangetic Plain. Of the various possible sites in this area, Hardaiganj in the U. P. was recommended with Sindhri in Bihar as an alternative site;
- (d) the Mission reached the conclusion that facilities exist in India to enable about Rs. 6 crores to be spent in the country out of the total of Rs. 10.1 crores; and
- (e) no fertiliser other than sulphate of ammonia was considered suitable for manufacture under Indian conditions generally or locally.

The Government of India after consulting Provincial Governments decided that arrangements for the production of the required quantity of ammonium sulphate in India should be taken in hand. It was also decided that Central, Provincial and State Governments should be the shareholders in the concern and

each party should also guarantee an offtake of a specified quantity of the product. The intention is that the fertiliser, when it comes into production, will be sold to the various States and Provincial Governments at a "no-profit-no-loss" basis, and if any State or Province wishes to subsidise its sale to agriculturists, they should do it at their own cost. A statutory corporation under the aegis of the Central Government will be responsible for the management and running of the factory. The Central Government will hold a substantial share in the financing of the project. It was also decided to locate the 350,000 tons per annum factory at Sindri in Bihar, as it is near to coal deposits. The possibility of erecting another factory to produce 100,000 tons of ammonium sulphate per annum at a site south of Vindhyas is also to be investigated.

In order to expedite the project, it was considered most essential from the point of view of foodgrain production in India that a Mission consisting of Sir James Pitkeathly, Officer on Special Duty in the Supply Department, Dr. M. Qureshi of the Osmania University and Dr. K. M. Chakravarti of the Dacca University should proceed to the U. K. and to the U. S. A. The Mission was especially charged with the responsibility of investigating the processes and plant employed in the manufacture of ammonium sulphate, both in the U. K. and in the U. S. A., with the object of securing for India the most up-to-date plant possible for the production of this type of fertiliser from indigenous materials. After lengthy investigations with U. K. and American experts, the Mission submitted its recommendations and the Government of India have now sanctioned the negotiations of agreements for the supply of plant and machinery for the factory and for the erection of the factory. The plan is well in hand and the present position is as follows (Aug., 46).

A Chief Technical Adviser (Fertiliser Project) has been appointed in the Secretariat of the Department of Supply to deal with the Project. The main agreement with the Chemical Construction Corporation of America for the design of the whole factory, supervision of the erection of the factory and seeing it into production at its rated outturn has already been concluded. Negotiations are well on the way with the Power-gas Corporation for the Supply of certain specialist plant of their own, procurement of other items of plant and machinery on behalf of the Central Government, and their erection under the supervision of the American experts. The land required will be placed at the disposal of Central Government shortly for work by the C. P. W. D., Bihar P. W. D., E. I. Railway, etc. Designs for the water supply arrangements to be undertaken by the P. W. D. Bihar have been completed. The re-conditioning of the Jharia-Sindri road to make it fit for heavy traffic is complete. Estimates for the cost of the construction of the railway up to the entrance of the factory have been accepted and orders issued for the work to be put in hand. To produce 350,000 tons of ammonium sulphate 536,000 tons of gypsum and 178,000 tons of coke and 249,000 tons of coal would be required. A two-hundred ton of gypsum sample from Khewra has been sent to the U. K. for test purposes and a very favourable report has been received. Commitments to the extent of over Rs. 4 crores have already been entered into.

The operation of the fertiliser factory at full outturn will produce some 900 tons of calcium carbonate sludge per day. A use for this by-product can be found in the manufacture of cement which will be required in large quantities in the area of Damodar Valley, if the Damodar Valley Flood Control Scheme is put into operation. It has, therefore, been decided that Govt. will erect and operate a cement factory as part and parcel of the fertiliser factory project.

Other factories.—If India is to develop her agricultural potentialities fully to maintain her increasing population, she would require very large quantities of ammonium sulphate and superphosphates. For her 20,000,000 acres of irrigated land under rice alone, at about 1 cwt. per acre of each of these fertilisers, she

would need 1,000,000 tons of each fertiliser. -It would, therefore, be desirable to fix a programme to aim at a target figure of 1,000,000 tons each of ammonium sulphate and superphosphate in the immediate period. This can in no way be considered ambitious, for even a small country like Egypt uses 500,000 tons of fertilisers per annum.

Apart from the Government scheme of producing 350,000 tons of ammonium sulphate per annum, private firms are also expanding their capacity. The Mysore Chemicals and Fertilisers are doubling their capacity of ammonium sulphate and necessary facilities for importing equipment from the U. S. A. have been given. The installation of ammonium sulphate plant by Fertilisers and Chemicals, Travancore, at Alwaye, with a capacity of 50,000 tons per annum is nearly complete and production is expected to commence in October 1946.

Further expansion in the production of superphosphate aiming at a total production of 50,000 tons per annum for which, with the cessation of hostilities and the installation of new sulphuric acid plants, supplies of sulphuric acid are becoming available is in hand. Messrs. Parry & Co., Madras, have already expanded their production of superphosphates from 1,000 tons to 5,000 tons per annum. Other firms like Messrs. Dharamsi Morarji and Messrs. Delhi Cloth Mill Chemical Works are similarly expanding their production.

CHAPTER LXX

MISCELLANEOUS INDUSTRIES

HARNESS AND SADDLERY AND OTHER ARMY EQUIPMENTS

The pre-war output of the only Government Harness and Saddlery Factory at Cawnpore was valued at about Rs. 55,00,000 per annum. Owing to the large expansion of the Indian Army and the extended operations of the Allied Armies in India and neighbouring areas, the demand for Harness and Saddlery and other army equipments increased tremendously. This had to be met primarily by the Cawnpore factory which employed only 5,000 workers in 1939. It was, however, soon discovered that the armies' requirements for this class of goods could not be met without bringing in other sources of production. Hence in July 1940, an organisation then known as the Industrial Production Organisation was established in Cawnpore to work along side and in collaboration with the Harness and Saddlery Factory in developing trade production of this class of goods. Another step taken in this direction was the institution of five Branch factories which enabled the attainment of the war production valued at Rs. 71,98,00,000 or an average of 11,99,66,000. This increase was 21.8 times the pre-war figure. The total value of the materials fabricated in this period was Rs. 35,22,00,000. Below are given production figures year by year from the outbreak of war to the 30th September, 1945:—

	Rs.
1st September 1939 to 31st March 1940	42,00,000
1940-41	4,25,00,000
1941-42	16,08,00,000
1942-43	18,52,00,000
1943-44	15,80,00,000
1st April 1945 to 30th September 1945	5,37,00,000

The attainment of the above production required the increasing of production by five-fold in March 1941 and then quadrupling that figure by March 1943. The bulk of the stores made had either not been evolved at the out-break of war or they had not previously been made in India or their manufacture had never been contemplated. These achievements were the results of activities embracing a wide field of production. They entailed the reviving of moribund trade, the creation and development of new capacity and the raising of trade and bazar production standards to a level of efficiency acceptable to the most exacting inspection. The stores produced ranged from Boot-Laces to Assault Boats, from Eyelets to Radio parts, Photographer Plates, Structural Steel and Pontoon Bridges.

The pre-war Harness and Saddlery Factory was almost exclusively meant for the production of Military Saddlery and Harness equipment of all types. The factory was self contained and had its own tannery and curriery departments. There was also Drop forging, Smithy, Brass Casting and Press shops and a wood-working Section, all devoted to the production of the thousands of different Harness and Saddlery Fittings and Components. The policy was to prepare, by cutting in the Main Factory, all main materials which were then issued to outside leather workers and firms for final fabrication.

In November 1941, large scale orders for the manufacture of Webbing (Personal) Equipment sets were placed. This store required 33 widths and thicknesses of Webbing and 19 different types of brass Components. One of these

components called for 20 production operations. To cope with this activity webbing looms had to be built and three quasi-Government Fabricating Factories were started. 5,700,000 Sets of Webbing Equipment were produced. These required 843,600,000 Brass Components.

In December, 1943, orders were placed for the production of certain items of parachute Dropping Equipment and up to 30th June 1945, the Webbing Equipment Factories in Calcutta had produced the following:—

	Rs.
Packs Parachute.	980,000
Sets, Container (Mk. VA and SDB).	1,196,000
Percussion Heads.	1,317,000
Webbing Sets.	1,940,000
Spare Straps.	470,000

With the cessation of hostilities war demands for harness and saddlery and other equipments have considerably fallen. The Branch Harness and Saddlery factories at Cossipore, Amritsar and Madras have already been closed down.

FOOTWEAR

Footwear is, with food and clothing, an essential article for an army in all ages, whatever be the types of weapons used. It might be expected accordingly that the foundation of the footwear supply problem could be laid in peace-time and be ready for automatic expansion when war comes about. The facts, however, are far different. Service footwear is of a specialised type. The plant and lasts needed are not suitable for the bulk of civilian requirements. Only a few firms are needed to produce the limited quantities of boots required for the peace-time army. The output of very many more firms is needed to meet the situation which arises when millions of men are called to the Colours, and new problems of organisation have to be faced and overcome.

More complicated are the problems relating to the supply and distribution of leather for the Service footwear. Much of the leather used for civilian purposes—both upper and sole—in peace-time is not suitable for Service footwear. Heavier sole leather and thicker upper leather are needed for a man in the army than, generally speaking, the same man has in his peace-time vocation. Leather unfortunately cannot be made to specification as cloth and other readily standardised articles can. It has to be manufactured from hides and skins which, for the most part, are the by-products of meat and are extremely variable in many respects.

In India, before the war, footwear manufacture was largely done by village cobblers, mostly to order, and the kind of footwear made was largely chappals and sandals. There was a demand for shoes of the modern type in cities and larger towns and this was met to a large extent by the smaller shoe-making concerns as well as by large factories like Cooper Allens.

In war-time, the footwear demand for the Defence Services increased tremendously. From a bare 100,000 pairs in the last pre-war year, the supply rose to 8.6 million pairs in 1941, 5.9 millions in 1942, and 6.6 millions in 1942. This increased demand was mainly met by Cooper Allens and Batas.

The value of purchases during 1939-40 to 1944-45 and the first seven months of 1945-46 of leather and leather products is approximately 36 crores of rupees. Footwear is the main category and the following figures will give an indication of

the quantities and values of the different types of footwear supplied to the Defence Services:—

Category	Quantity	Value (Rs.)
		Crores.
1. Ankle Boots Nos. I & VI	16,339,000	16.69
2. Chaplins, F, P.	5,311,000	2.65
3. Other footwear supplies (shoes black leather, RAF shoes and Miscellaneous footwear).	..	2.84
Total	..	22.18

About 70—80 per-cent. of ankle boots have been supplied by Messrs. Cooper Allen & Company. This tremendous increase has been achieved by working night and day shifts and the standardisation of production, viz., the few types of footwear required for the Defence Services as compared to the numerous civilian types required to meet the varied requirements of the civilian population.

Besides leather-footwear, India in pre-war days produced large quantities of cheap rubber footwear and the capacity for production is considered to be in the region of some 10 million pairs annually.

There is a large reduction in the demand for military boots but the footwear factories are switching over to the production of civilian footwear.

GRINDERY

An important subsidiary industry connected with footwear manufacture is grindery, viz., the production of heel and toe tips, eye-lets, nails, thread, etc. These have always been imported largely because production of an economical size was not possible in India. But when importation became difficult owing to the war, it became essential for India to meet her requirements. Therefore indigenous manufacture of grindery was tried from the beginning. The Supply Department made every effort to encourage production. Several firms in Northern India undertook to manufacture grindery and succeeded to making a fair substitute for the imported article. The quality was inferior, but India was compelled to rely on the internal production, as it had no other alternative. Millions and millions of pairs of different articles were produced in war-years. In 1943 alone 28 million pairs of grindery stores were manufactured.

The future of these subsidiary industries is rather uncertain. India has neither the plants required for producing grindery on economic lines nor the market capacity to justify the importation of machinery for such production.

PAINTS & VARNISHES

Paints, varnishes, enamels, distempers and dry colours are of great importance in modern industry. They are used in the interior as well as the exterior of public buildings and dwelling houses. High grade enamels are employed on tramways, houses, railway carriages and ships. Varnishes are used for a variety of purposes. Special formulations are needed for corrugated-roofs, workshops and Industrial machinery. In short, practically every industrial product manufactured for war purposes demands the protection of paint, and as munitions are called upon to stand the strain of conditions which are enormously greater than any conditions to be faced in peace-time, adequate protection must be provided

no matter whatever the cost. By far the greater number of finishes are required for the protection of metal, wood and fabric surfaces, but there are many types of special finishes required such as insulating varnishes for electrical equipment, etc.

India is rich in most of the raw materials required for the production of paints and varnishes. The first paint factory in India was started in 1902. Since then production has increased greatly and when the war broke out, India was producing about 24,000 tons of paints and varnishes. This, however, met only about 60 per cent. of India's requirements. In most factories the machinery is operated by electric drive. In the varnish section the pots are heated by coke or gas.

In war-time the Industry was called upon to supply paints and finishes for camouflage paint, anti-gas varnish and gas resisting paint and aircraft dope. Anti-gas varnish formulated from wholly indigenous materials like shellac, glycerine and linseed oil was manufactured in the country. Nitro-cellulose dopes for application to aeroplane fabric were also produced using waste film, shellac or castor oil. Upto August, 1942, dope production in India was not considered a practical proposition except by importing 80 to 90 per cent., of the ingredients. The formula was shrouded in mystery. A new formula was devised by using old films and 85 per cent. indigenous raw materials. The manufacture does not require any elaborate machinery and India can now manufacture about 100,000 gallons annually. With slight modification, the formula can be adopted for car finishes, high quality furniture lacquer and manufacture of artificial leather. As luxury finishes were completely displaced in war-time, imports of raw materials from overseas were very much restricted and substitutes had to be evolved for certain difficult items. In particular, mention may be made of (1) the introduction of Bauxite as a pigment material; (2) the extent of the use of earth pigments with a view to conserve chemically prepared whites and lead chromes; (3) the production of dehydrated castor oil which is a partial substitute for tung oil.

The total productive capacity of the industry is over 30,000 tons a year but actually due to shortage of raw materials and transport difficulties, production during war years was limited to about 26,000 tons. The principal manufacturers such as Shalimars, Jenson & Nicholson, Hadfields, Hoyle, Robson & Co., etc., formed a Panel called the Paint Supply Panel and were under cost plus agreement with Government. Government purchases during 1942, 1943, 1944 and 1945 amounted to 13, 12, 19 and 20 thousand tons valued at approximately 120, 120, 193 and 190 lakhs of rupees respectively.

Future.—Civil consumption before the war was about 30,000 tons and there will be no difficulty in the civil market absorbing the entire production. Imports of chrome colours, lithophane, zinc and lead oxide and turpentine will, however, have to be arranged for. Indigenous capacity for the manufacture of zinc and lead oxide is likely to be sufficient to meet the requirements of the paint industry. There is one firm manufacturing zinc oxide. Indigenous manufacturers may be able to hold their own against foreign competition provided they get zinc and lead at reasonable prices.

CYCLES

Before the war there were two plants engaged in making cycles, one an assembling unit and the other a manufacturing unit. During war, the industry was called upon to meet the requirements of the Defence Services. This led to the establishment of a third plant. The companies now producing cycles are the Hind Cycles Ltd., Bombay, and the Hindustan Bicycle Manufacturing Corporation Ltd., Patna. The two concerns manufacture all cycle parts excepting free wheels, chains, spokes, nipples and steel balls. Government have given facilities for the imports of these parts and special steel. Certain controlled chemicals like zinc sulphate, oxygen acetylene (and sulphuric acid in the case of Hind Cycles Ltd.) were also issued to the firms.

The annual estimated output of Hind Cycles is 25,000 and of the Hindustan cycles is 15,000. The capacity of the firms is 75,000 a year, though the present production is only about 20,000. The entire production of the two firms is now available for the civilian market. It is doubtful whether the Indian firms will be able to compete with the foreign cycles easily. Their selling price is still higher than that of the imported article. The firms will have to adopt mass production methods and bring their cost of production down if they wish to survive the post-war competition.

SEWING MACHINES

The industry was not in existence before the war. Even during war Defence requirements were met mostly by imported goods. There is only one unit M/s. Jay Engineering Works—manufacturing the usual household type of sewing machines which goes mostly to meet the civil needs. In 1943 they produced about 600 machines but production has gradually risen and it is now about 4/5,000 machines per annum. The normal internal civil consumption is estimated at about 100,000 machines a year. With the arrival of a new plant whose import has been recommended, the company should be in a position to make heavy type machines also. There is scope for more units.

✓ POTTERY (CROCKERY & STONEWARE)

There were two main classes of crockery in use in India—(i) crockery made in the old style, jars, bowls, plates etc. and (ii) crockery made in modern style. The demand for the latter type was met largely by imports from Europe and Japan. A certain quantity of such crockery was also made in India in Calcutta, Gwalior and Bangalore, but the product could not compete with imported stuff.

During war, a large military demand arose for all kinds of crockery—plates, dishes, teapots, saucers, basins, tumblers, etc. This gave an opportunity to the existing concerns to expand their production. Bengal Potteries expanded their equipment by laying down tunnel furnaces and producer gas plant etc. The Bangalore factory which formerly made insulators took also to crockery. New potteries were also started, e.g., the Ceramic factory at Kundra, Travancore. Some of these potteries were taken over by Government and managed as Government concerns (Art and United Potteries, Calcutta). The present production is about 1,000 tons but the potential capacity is 2,000 tons. The purchases made by the Supply Department alone in 1942, 1943 and 1944 amounted to 1,300 tons, 914 and 1,108 tons respectively. These absorbed approximately 50 per cent of the capacity of the industry. The manufacturers should find no difficulty in selling all their production in the civil market as there is an acute shortage. The factories are however generally poorly equipped and lack technical supervision. If these defects can be set right, the industry should look to the future with confidence.

CUTLERY

This industry has been pursued on a small scale by the village blacksmith from times immemorial. In recent times larger units of production have come into being owned by enterprising smiths or others. The lines of production largely conformed to the rural requirements—namely, knives of various kinds, spoons, butcher's implements, farm implements like sickles etc. Factories worked with steam or electric power were also started and these made cutlery of the modern type and surgical instruments. But such production continued to be small for long and the large proportion of the pen-knives, table knives, scissors, razors, spoons and forks etc. used in cities and towns was imported.

Production is scattered throughout the country but there are certain areas which enjoy notable hereditary skill; for instance, Aligarh and Moradabad in U. P.; Nizamabad and Wazirabad in the Punjab. The bigger factories are located in cities like Calcutta, Lahore and Bombay. The industry was mostly dependent on imported steel.

The war created a large demand for spoons, which gave a fillip to the industry. The Supply Department dealt with some of the larger producers. In other cases orders were placed with contractors who purchased partly wrought articles from rural areas and got them finished in workshops maintained by them. The production enormously increased and the total military demands in 1943 came to 5,800,000 pieces valued at Rs. 96 lakhs. The Supply Department mostly purchased knives clasp, knives table, forks, spoons, locks and padlocks. The purchases of all kinds during 1942, 1943, 1944 and 1945 were Rs. 10,300,000, Rs. 4,100,000, Rs. 6,200,000 and 4,750,000 respectively.

The goods now made to meet Defence demands are also suitable for civilian markets except that a greater variety may be required.

BRUSHWARE

Brush-making industry existed in India before the war on a small scale. Brushware Limited, the largest brush-making factory in India, responsible for 75 per cent of India's total manufactured brushware was engaging only 200 labourers and its sales for the six months ending May 1939 were not more than Rs. 83,000. The market for bristles, with which brushes are made is centred in U. P. and the production of brushes is localised in Cawnpore, Agra and Bareilly. The price of 'shorts', the popular form of Indian bristle was, before the war, Rs. 2-8-0 to Rs. 3 per seer.

U. K. and U. S. A. had been importing bristles in large quantities from China, Poland, Russia and India. Since the outbreak of war, Indian bristles have been in great demand mostly for the Army and all exports of bristles from India were stopped except under an informal control. The Army was urged to economise as far as possible in the use of brushes made of bristles. The price of 'shorts' was originally fixed by Government at Rs. 7 per seer and had to be varied according to changing circumstances. Besides Messrs. Brushware Limited, many smaller manufacturers have developed their productive capacity or gone into new types of production which used to be imported previously. A few of the special types of brushes so developed are Brushes writing, sable hair (with indigenous material); Brushes writing camel hair (as substitute for sable hair); Brushes Vulcaniser Flux Small; Brushes Aluminium Soldering, etc.

The labour force of Brushware Limited rose from the pre-war figure of 200 to 2,000. The purchases made by the Supply Department on account of Defence Services demands amounted to Rs. 17, 35½ and 48 lakhs in 1942, 1943 and 1944 respectively.

The main raw materials (wood and bristles) are available in this country but certain fibres, hair, wire, etc., are still being imported. The present production is worth about Rs. 48½ lakhs. The general shortage of horse hair, bristles, imported steel wire, etc., may not allow any further increase in the present production capacity.

ROPE MANUFACTURE (HEMP AND COIR)

Pre-war.—The chief raw materials for ropes are Manilla hemp maguey from Philippines, Sisal hemp from Africa, Coir from South India, and Indian hemp from U. P., C. P. and Eastern States, Bengal Hemp, Jute and cotton. Six factories and several hand-manufacturing concerns were making hempen ropes in Calcutta and the neighbouring districts. The investment in the industry came to about Rs. 30 lakhs. The unit of production varied from a 2 oz. ball of twine to a 4 ton coil of rope. The making of ropes and other articles from coir was localised in Travancore and Cochin where it was largely a cottage industry subsidiary to agriculture. All the rope factories employed machinery, while others did the bulk of their manufacture by hand. About 3,000 labourers, mostly semi-skilled, were employed in this industry, in the Calcutta area alone.

The Indian cultivators use considerable quantity of rope but make for themselves most of the rope they need. Nevertheless the whole output of Indian rope factories was sold in India. There were besides considerable imports from the U. K. of transmission ropes made from Manila hemp and cotton. A cheaper variety called yellow rope was also imported from Japan in large quantities and was sold at prices scarcely higher than those of which India was importing the necessary raw materials.

In normal times, the main item of rope industry was Manila hemp. Although in 1929, the Tariff Board recommended that there should be no import duty on Manila hemp, such a duty was in existence right up to the outbreak of this war.

In War-time.—Large quantities of all kinds of ropes were required for war purposes. This heavy demand led to triple-shift working in all the factories making hemp ropes. The existing machinery was strained to the utmost by the triple-shift working. Defence service orders accounted for 75 per cent of the total production of hemp ropes and there was no civil export. The bulk of the demands (about 60 lakhs in 1943, 80 lakhs in 1944 and 50 lakhs in 1945) were by agreement placed on the Travancore Government. This Government in collaboration with Cochin controlled the prices of yarn and worked with specific ceiling prices of yarn.

With the loss of Philippines, Manila hemp ceased to be available and sisal hemp was used instead. But the quantity of sisal available in India was so small, that imports were necessary. Indian hemp was also used, mostly of the Banjam type, though in normal times most of this material was exported. This type of hemp required proper processing for which imported machinery was essential. Indian hemp was also used in the manufacture of camouflage nets. The whole of the Bengal crop of hemp and a large part of the U. P. crop were used in this way. The loss of the continental markets on which the coir industry was largely dependent led to the closing down of many coir factories, and caused large scale unemployment of labourers on the Malabar Coast. But with the progress of war, the position improved and prices of coir ropes and other articles again rose.

Future.—This is an established industry. All ropes manufactured during war-time for Defence requirements should be suitable for civilian market and re-adjustment should not present any technical problem such as re-tooling of plant, etc. The home market and exports to ports of Akyab, Penang, Rangoon, Saigon, Bangkok, Shanghai etc. are likely to be sufficient to keep the factories working only for 6 to 8 hours daily unless Government take steps to remove the tariff duty on imported raw fibre and ban the import of manufactured ropes. This means that unless new markets are found, it is likely that some workers may be thrown out of employment. Development of indigenous fibres should be taken up seriously. A lot of preliminary work has already been done and if steps are taken to ensure more systematic expansion of cultivation and also to introduce improved decortication methods this should in time make the industry self-supporting in the matter of raw materials.

SCIENTIFIC INSTRUMENTS

Manufacture of scientific instruments is still an infant industry in India. Before the war there was no production of instruments and apparatus of a specialised character. Only simple instruments were produced. One estimate put the indigenous production at 5 per cent of the total annual consumption in India. The chief producers of simple type of scientific stores and drawing instruments were Messrs. P. Orr & Sons, Madras; Laurence & Mayo, Bombay; Balance Works, Benares and National Emporium, Roorkee. In addition to these private firms, the Mathematical Instruments Office at Calcutta, a Government factory under the E., H. and L. Department, was the main pre-war source

of supply of scientific instruments and stores for the Survey of India and other Government Departments.

During war, the number of firms producing scientific instruments has increased to about one hundred and sixty but very few of them are well equipped. The Mathematical Instruments Office has been enlarged and converted into an Ordnance factory, and the work of manufacturing simple stores like drawing boards, stands, instruments, sun compasses, etc., has been taken away from it and given to the private firms. This left the M. I. O. free to concentrate on the production of the more important stores such as binoculars, prismatic compasses, sighting telescopes, etc. The industry is mainly concentrated in Calcutta with 95 of the total 160 firms located there. Lahore comes next with 21 firms.

The scientific stores produced during the last five or six years were for war purposes and may not be in demand in future. If the present capacity is diverted to the production of scientific instruments for the civilian market, and if these can be produced at competitive prices by adopting mass production methods, there may be some scope of retaining a high percentage of the technical personnel employed by the industry. If new lines of manufacture like cameras, sound film projectors, optical and electrical instruments, etc., are contemplated, experts will be required, but the industry will become broad based and stable.

ALCOHOL (DISTILLERIES)

The outbreak of hostilities in 1939 placed a heavy burden on the manufacturers of industrial alcohol and solvents, as these materials enter very largely into war production. The list of usages of industrial alcohol and its derivatives, such as acetone, butyl alcohol, and acetic acid is formidable and covers, among many others, the manufacture of propellants, war gases, liquid coolants for aircraft engines, air-screw de-icing, parachute fabric, hydraulic fluids for power-operated gear for air-craft and armoured fighting vehicles, and plastic materials and finishes of all kinds. The bases for manufacturing alcohol are molasses and Mowha flowers.

Of the raw materials mentioned, molasses is obtained in large quantities as a by-product of sugar manufacture. Hence the importance of the alcohol industry in U. P., the largest centre of sugar industry. Before the war the use of molasses for this purpose was not extensive. The Mowha flower is mostly found in the U. P. and C. P.; in C. P. the alcohol manufactured is almost entirely from Mowha flower. In Bombay and Madras also alcohol is made from molasses.

War gave a great stimulus to the production of alcohol. Large demands for alcohol came from the Cordite Factory (Arvankadu), High Explosive Factory (Kirkee), Ordnance Services and Railways, and Central Provision Office. In 1943, the demands for Defence purposes amounted to 14,50,000 and in 1944 to 22,00,000 gallons. Another million gallon was used for war effort in an indirect way, i.e., for use in medicine (D. G., I. M. S.), fuel for Tommy cookers, Jack Fluid, Air Forces De-Icing Spirit, Aeroplane Dopes, etc.

In order to meet this increased demand, a distillery was started in the U. P. Several more are under construction there. A new distillery has also started working in the Kapurthala State and one in the Bombay Province. Necessary assistance has been rendered to all these ventures by the Supply Department.

The present production is estimated at 10 million L. P. gallons per annum, but the potential capacity is much more, about 14 million L. P. gallons. There is scope for even further production if need be. Some portion of the molasses produced in U. P. and Bihar is used up in sweetening tobacco and the rest is either destroyed or thrown into the fields as manure.

ENAMELWARE

Before the war, the enamelware industry in India was in its infancy. There were three important firms, viz., Bengal Enamel Works, Patna; Sur Enamel Works, Calcutta; and the Indian Enamel Works, Bombay. Production began about the year 1922.

The two major handicaps under which the Indian industry suffered, were firstly its lack of knowledge of the practical side of manufacture, and secondly the increasing Japanese competition. The Japanese were able to dump enamelware in India because of their national policy of procuring raw materials, particularly black sheets at a much cheaper prices than those prevailing in India. Industrial chemicals such as borax, soda ash and cryolite were also imported into Japan duty-free. This competition eventually led to the total collapse of the hollow-ware manufacturing business in this country. Indian industry, however, revived with the outbreak of Sino-Japanese war.

The war gave a great fillip to the industry and a number of production units sprang up. Twelve firms are now producing enamelware. The Bengal Enamel Works is the largest supplier of enamelware to Government. The other big firms are, the Sur Enamel Works, Calcutta; Vizir Enamel Works, Bombay and Leslie and Company, Bombay. The present production is about 32 lakh units. The Supply Department purchases during war years amounted to 126 lakh units in 1942-1945. Due to the acute shortage of raw materials like borax, sulphuric acid, steel sheets and coal in war time, firms were not even able to meet full military demands and it was decided to have only one coating.

The industry is likely to expand further for catering to the home market, and may even be able to develop a flourishing export trade with China, Malaya and other Eastern countries, giving employment to an additional 10,000 people. If, however, Japan is left free to dump enamelware products throughout the East, the above prospects may disappear.

BUTTONS

Buttons made of horn, bone, etc., have been produced in India from generations past as a cottage industry. As the Army was unable to accept these buttons due to some 'boiling test' etc., nut and coconut shell buttons were accepted as substitutes, and two firms in the Punjab, Messrs., Janda Manufacturing Co., Ltd., Lahore, and International Manufacturing Co., Ltd., Lahore, began to produce about 150,000 gross buttons at the low price of one rupee per gross. The Indian nut or coconut shell could not be used in buttons of bigger sizes and imports had perforce to be resorted to of East African nuts of bigger sizes for the production of buttons of sizes above $\frac{1}{4}$ ".

Buttons of galvanised iron were also made in small scale units, mainly to meet the war demand. The Supply Department supplied about two to three lakhs gross of buttons (G. I.) every month. These buttons did not, however, conform accurately to specifications and were suitable only for hand-stitching. They were of $\frac{3}{8}$ " diameter and suitable to be used on trousers. Attempts were also made by the Supply Department to establish power presses and units with a proportionately large capacity to turn out accurate buttons for machine stitching. Its price, however, was a little higher. Besides these cotton-thread buttons were also being produced as a cottage industry. There is a large demand for these in the civil market, but there is no scope of using these for army needs as the I. M. Specification does not permit their use.

In the post-war period, coconut shell buttons and horn and bone buttons will have to meet the competition of Japan and Italy, who had the monopoly of button supply in India before the war. The G. I. buttons industry also will not have much scope except for military purpose.

OXYGEN ACETYLENE

This industry is an important subsidiary to modern engineering and to the iron and steel industry and dates back to 1923, when the first factory was started in India. It is essential for gas-welding of both ferrous and non-ferrous metals and for the accurate flame-cutting of steel and iron. Oxygen and dissolved acetylene are manufactured in two different factories and are brought together through medium of a blow pipe. In pre-war days there were factories making both oxygen and dissolved acetylene at Calcutta, Lahore and Bombay while the Jamshedpur and Karagali factories were only producing oxygen. Oxygen compressing stations were at Cochin, Bangalore, Bombay and Cawnpore. In 1935, the principal producing units in India were purchased and brought under amalgamation by the Indian Oxygen & Acetylene Co., Ltd., which thus have a virtual monopoly in the oxygen and acetylene distribution set-up.

With the outbreak of war, demand greatly increased. In 1940, nine factories were set up by the Oxygen and Acetylene Co., and the production rose from 200 million cft., in 1939 to 335 million cft., in 1944. The increase was effected mostly within the capacity of the existing plant but some additions were also made. Government demands during war years 1942, 1943, 1944 amounted to 21, 26 and 35 million cft., respectively and the rest was consumed by civil market.

The whole of the present production can be used for civilian consumption. The total civil consumption is likely to be more due to the advancement of the engineering industry. Of the materials used in the industry, calcium carbide and acetone will be available in India.

CHAPTER LXXI

SMALL SCALE INDUSTRIES

Introduction.—From time immemorial agriculture has been the primary industry of India. Though agriculture was the traditional industry of the country, the arts and industries were not neglected or relegated altogether to the background. The arts and industries developed mostly in cities or towns but even small villages were not without their craftsmen. Weavers, blacksmiths, carpenters, masons etc., are found in all villages and have always been playing an important role in the industrial life of the country. The country has centuries old traditions of mechanical skill and genius. A good deal is heard of native skill in textiles of famous weavers of Indian Muslin. All over the country, small workshops are scattered fitted with a few machines that are operated by fairly skilled persons. These operators are mostly illiterate and cannot even read a blue print or follow a drawing, but they are so skilled that if a sample is shown, they can manufacture a counter sample within a reasonable time. The Government of India too has been giving certain grants to encourage small scale industries. Orders on small scale industries were originally in respect of a limited number of articles, although the money value of these orders was quite substantial. These items were camouflage nets, pith hats, blankets, chaplis and timber articles. In the year 1941-42 orders to the extent of 498 lakhs were placed on small scale industry. These comprised camouflage nets (Rs. 182 lakhs), woollen blankets (Rs. 118 lakhs), leather goods (Rs. 96 lakhs) and pith hats (Rs. 43 lakhs). Some of these centres of production were so organised as to retain the character of small industry and yet to give an output of mass production.

Decision to develop small scale industries capacity—New Delhi Conference, March, 1942.—The situation underwent a radical change early in 1942 owing to the Japanese success in Malaya and Burma, and the Supply Department found it necessary to review the whole position. It was decided that one of the measures to be taken to meet the altered situation was to make an increasing use of the war potential of the small industries in the country. Accordingly, the Supply Department convened a conference of representatives of Provincial Governments and Indian States to consider the use of small scale industry for the production of war supplies in March 1942. The object of the conference was to discover new and develop existing sources of production in order not only to increase the volume of supplies but also to provide a measure of insurance against loss of production, due to the dispersal of labour from organised industry which was then expected to occur for various reasons. The scheme as visualised had many advantages such as, provision of employment to a much larger body of men which was an important consideration in days of stress and strain, dispersal of effort with a view to economy in transport; the setting up of alternative sources of supply with a view to minimising susceptibility of areas of production to air attacks; relief to organised industry so as to undertake additional loads for which it was more suitable than small industries; and the harnessing of the abundant brass and iron scrap in the country which could only be laid hands on, through the instrumentality of the smaller producer.

It was agreed that all Provincial Governments and States participating in the scheme should establish official agencies with whom the Department of Supply would contract for the supply of certain goods which could suitably be manufactured by the small-scale industry.

The official agencies were responsible for all the work, but the Supply Department was to give all possible help, if required. The Official agencies would deal with the Department of Supply through their respective Controllers of Supplies who had very wide powers so that references to headquarters would be very few.

Under the scheme which emerged from the conference, lists were prepared of articles suitable for procurement through small scale industries. List I contained hand-made and machine-made articles, such as, dogs hogging, trolley frames, tower bolts and sockets, ventilators wire netting, skewers, tawas, lamp shades, steel trusses, rain water pipes, door handles etc. List II contained items such as chairs, tables, charpoys folding, baskets, helves, tent mallets, sandals, chaplis, boots, pith hats, camouflage nets, cutlery items, locks, stretchers, ambulance etc., etc. It was proposed to procure items contained in list II from small scale industries during 1942-43. Quantities required and ceiling prices considered reasonable were also shown in the list. Official agencies were set up for organising small industries within their areas, securing contracts for articles which could be supplied by them, affording assistance in the matter of raw materials, finance, stage inspections and relations with the Supply Department and generally to promote the working of the whole scheme. It was decided that the stage inspection or inspection in the course of manufacture would be the responsibility of the Provincial Governments. It was realised that products of the small scale industry vary in the quality of work as it is difficult for industry of this class to work to narrow tolerances and so it was decided that the general criterion would be an article sufficiently good for the purpose.

The object in utilising small scale industry was to spread orders throughout India as fairly as possible. Government felt that small scale industry was not always the cheapest way of producing goods and therefore they recognised the need in some cases to pay higher prices than would be paid to organised industry. It was felt that the prices to be paid must take into account the following:—

- (1) payment necessary to take off the initial inertia and get production under way, and
- (2) payment to include the extra overhead charges which the different provinces might find it necessary to recover according to their different circumstances.

The basis of the scheme was that no Province or State should make a profit out of the orders placed on small scale industry. Ceiling prices were fixed so as to render the working of the scheme practicable, but not so high as to encourage the manufacture of goods in areas which were not economically suitable from the point of view of the availability of raw materials, skilled labour, etc.

Steps taken to implement decisions of the Conference.—A special officer toured the various provinces and states to give the Controllers of Supplies and the Official Agencies all possible help to implement the scheme. The object was to have a clear idea of the existing and potential capacity of small scale industries and to devise ways and means to harness this capacity for war production. In the early stages, the scheme was faced with two difficulties, viz., absence of samples and high ceiling prices. Later on the first difficulty was gradually solved by the supply of samples. Nervousness was felt regarding inspection and it was feared that the stores obtained through small industries

might suffer very heavy rejections. It was recognised that it was more difficult to keep to the pattern in small industries than it would be in large scale or mass production, but at the same time requests for deviations from or relaxations of specifications could not be agreed to. To overcome inspection difficulties classes were held for training stages Inspectors appointed by official agencies.

With regard to ceiling prices, there was a general feeling that the prices were pitched too high, but the official agencies were convinced that the prices had been fixed scientifically and were on the liberal side as compared to those obtained by the Central Purchase. The attitude taken was that a premium above the ceiling prices would only be justified where aptitude for manufacture of a particular store from the point of view of raw materials and labour existed and that too for a limited quantity and a limited period. No individual province could, however, claim high prices simply on the ground of their favourable geographical situation.

Procedure with regard to placing of orders.—The official agencies were expected to locate sources of supply for items shown in the s. s. i. lists. As soon as they did so, they consulted the Controller of Supplies concerned and asked for a firm order. The Controller asked for cross-mandates from the Directorates concerned. The Directorates examined whether there were any uncovered demands. If they had, cross-mandates were issued. An idea of prices to be paid was also given. The Controller then placed firm orders. The first round of such contracts was treated as "educational orders" and a premium of 10 per cent was allowed on all such orders.

Early in August 1942, the Eastern Group Supply Council sent four indents containing different stores, the supply of which had at one time or other been refused by the Department of Supply. The Special Officer while touring the country also kept in mind these lists and whenever he was able to find capacity for any one of the item therein, he informed the Eastern Group Supply Council which accordingly placed firm orders in the Directorate General concerned. No assistance was to be given in regard to raw materials etc. as the idea was to make use of untapped raw materials from the interior.

Difficulties experienced in execution of the scheme.—(i) *Ceiling Prices.*—The idea that 'small scale industry' was an easy and economical source was fallacious. The small scale producer laboured under many disadvantages. He could not ordinarily compete with factory either in quality or in price, though he can relieve and under-study the factory. The basis of the scheme was that the official agencies must act as contractors to the Supply Department on behalf of their Provincial Governments on "no profit no loss" basis.

Fixed prices were settled proving for additional expenditure on staff, contingencies etc. The 'no profit—no loss' system helped in locating sources of supply according to the natural aptitude of the areas for the particular items and in the discouragement of attempts on the part of provinces to develop their own industries taking advantage of the Supply Department or at the cost of Government of India.

(ii) *Provision of capital.*—The Controllers of Supplies were informed that no capital assistance to finance factories should be agreed to. Government did not consider that the development of small scale industry called for the setting up of large or expensive factories, but if the official agencies still desired to set up any such factories, they must finance them. The only concession agreed to by Government was to make progress payments against monthly statements of actual expenditure certified by the Provincial Accountants General.

Suitable accounting procedure was devised in consultation with the Provincial Accountants General. The actual accounting arrangements, however, depended considerably on the local circumstances of each province and so no uniform procedure could be devised.

Some provinces seemed to think that the scheme had been launched to make up deficiencies in production through organised industries. This was far from the truth. The real object of the scheme was to meet the war requirements as well as provide increasing employment to small scale producers on war work in view of its advantage as a steadying effect with due regard to such considerations as prices, economy in transport, dispersal of effort for strategic reasons and the ability of Official Agencies to deliver the goods within time.

Achievements.—It took sometime to get the scheme under-way. However, by November 1942, the Controllers of Supplies placed orders against all cross-mandates received by them.

Large demands were met for items like cutlery, hand tools items, skewers, mugs, shaves saddlers, cylinder tins, pans frying fish, basins steel, chest tools, empty fitters, dhobi irons, mallet spades, shearing senating, taps, drains etc., lamp hangings, compasses magnetic glass, basins pudding, instrument testing avometers and avominers, projectors; handles of various kinds, tent mallets and poles of different sizes, hair combs, padlocks, knives tables, chaplis F. P., chaplis hospital I. T., sleepers hospital B. T., Camouflage nets, with hats etc.; pad-locks, chairs, tables, handles of various types, charpoys, baskets, helves, tent-mallets, sardals and chaplis, pith hats etc. The Indian States and Provinces all had their due share.

The scheme ultimately faded out owing to—

- (a) reduced demands;
- (b) uncertain production;
- (c) higher cost of production and
- (d) unnecessary implications and the changed circumstances from the point of strategy,

If there was ample capacity elsewhere for s. s. i. articles, it was not essential to go to s. s. i. unless there were extra supply considerations, political, economic or previous commitments.

It was also imprudent to supply steel to s. s. i. when it was in short supply at the expense of keeping competent workshops partly idle. It was not worth while to risk a waste of material for the sake of sentiment when established and efficient means of production were available. However, it must be said that while in the West the small scale producer was generally supplanted by mass production, in India the craftsman was not as doomed as his counter-part in other countries of the world. The war gave to the owner-worker of small industrial units a new importance in the national economy. His products were in ever-increasing demand and both he and the things that he made were brought into closer touch with the consumer at home and abroad. In short India's small industries were integrated by the war.

Indian supply policy was increasingly directed towards bringing the village craftsmanship of the small producer upto mass production standards. Whatever be the merits of the large scale organisation of industry, factories cannot be set

up in a day or a month or a year in a country like India. The small craftsman has his place in both the urban and rural economy of the land and he is likely to maintain it for a long time to come. In India the cottage industries, if organised properly can sometimes beat the bigger industries for the production of most of our ordinary requirements. The small industries have no expensive supervision, no large overheads, little investment charges and no dividends to pay. The labour costs very little for it is either the owner-worker himself or members of his family who run these industries and often it is an avocation supplementary to agriculture. Government would have been guilty of the grossest negligence if they had not incorporated the talents of the small craftsman into the great stream of war production from which flowed equipment for our own Defence Services and those of our Allies.

PART IV :—MISCELLANEOUS

CHAPTER LXXII

WAR SUPPLIES TO OVERSEAS COUNTRIES

To begin with, the effect of the war was immediately felt on our foreign trade and through it on other branches of economic activity. Trading with enemy countries came to a complete stop. Large markets for Indian goods were, therefore, lost while certain essential supplies also suffered contraction. Among the exports, oilseeds, hides and skins, cotton and jute were the principal sufferers and this was reflected in a slump in their price level with the exception of jute for some time. New markets were opened up for some of these goods either abroad or within the country. Thus the expansion of the Indian cotton-textile industry meant more consumption of Indian cotton while the large supply orders for leather and leather goods increased the Indian demand for hides and skins.

With the outbreak of war, India began to get large orders for sand bags and jute goods from overseas. The fall of France and losses suffered by the United Kingdom threw a great burden on her Commonwealth as a result of which a complete re-orientation of India's industrial and military effort became immediately necessary. India's geographical position lent her a special significance as a supply base. After the establishment of Eastern Group Supply Council, India began to supply goods to Eastern Group countries in larger and larger quantities. Supplies to the United Kingdom and the United States of America, of course, continued.

Important countries are taken below one by one:—

(1) **United States of America.**—As soon as the war broke out, America's interest in Indian products began to grow and many enquiries in regard to such goods as carpets, brass-ware, rugs, whips, saddles, horse blankets, sporting requisites, textiles, palm leaf matting, precious stones etc., began to be received. The trade in pig iron, manganese and Indian lac grew. During the first year of war, trade between India and the United States nearly doubled. The United States became the third biggest customer taking as much as one-tenth of our annual exports.

During July 1940, Dr. Gregory and Sir David Meek were sent to the United States by the Government of India to explore new markets there for exports excluded from Europe as a result of the blockade. They thought that the economy of the United States was improving and that a growing interest was noticed in Indian consumer goods. Their report did not suggest that the potentialities of the United States as a market for Indian goods were confined either to munitions or to certain staple Indian products. On the contrary the authors of the Report attached much importance to the cultivation of the American customer market for manufactured goods.

Many of the products which India shipped to the United States during the past few years have played a vital part in the successful prosecution of the war against Germany, Italy and Japan. India, has been the only source of some strategic materials for the United States. Mica is perhaps the most strategically important product imported by the United States from India.

To purchase the entire Indian output and to stimulate production to the highest possible level, there was set up in India a Joint Mica Mission under the control of the British Ministry of Supply but consisting of three United Kingdom and three United States members.

Jute, the world's principal bagging material, is another product for which the United States depended on India and which was all-important to the war effort. The United States imported both burlap and raw jute from India, but no sacking. One-half of India's burlap was exported to the United States and sewn into bags which were used for transportation of food. These bags were indispensable to the feeding of American troops and civilians. With the loss of Philippines and the East Indies, the sources of Manila and Sisal fibre were cut off and it became necessary to limit the use of jute and to schedule a very substantial programme for the production of jute rope.

There were other products for which the American war effort was dependent on India for large supplies. For instance, almost a quarter of American metallurgical manganese, a mineral absolutely essential for the production of both carbon and alloy steel was imported from the Central Provinces. About 20 per cent of the United States ilmenite came from India which was essential for making titanium pigments necessary for painting warships and other battle equipment.

Beryl, which is used in the production of beryllium copper alloys for aircraft manufacture and other war industries, was shipped to the United States from India. So were various animal skins used in making wind and rain-proof garments; coir used in making fenders for ships; talc which serves as an insulator in radio and radar equipment; lac, from which shellac is made; and tea.

India also supplied several thousand tons of rubber. Natural rubber was essential in varying proportions for the manufacture of hundreds of war and non-war products: tank treads, fuel cells, cable covering, footwear, hose and belting among them.

India aided America's war effort not only by exporting vital materials to America, but by furnishing supplies to American soldiers stationed within her borders. She did this through Reciprocal Aid, in keeping with the agreements between the United Nations for the pooling of war resources. The cumulative amount of reverse Lend-Lease to the United States of America came to about crores of rupees.

(2) **United Kingdom.**—India's supplies to the United Kingdom—supplies having a direct bearing on victory in Europe and Japan—consisted of textiles, cotton jute, union canvas, cotton canvas and yarn, mock leno cloth, tossa jute canvas, cotton duck and sandbags, boots, biscuits, golden syrup, anti-mosquito cream, cocoanut shells, etc., etc.

(3) **China.**—War orders to the value of over Rs. 25,000,000 (£1½ million) were placed in India by the National Government of China through their purchasing agents, the Pekin Syndicate Limited. The items ordered included several million yards of cotton cloth for uniforms etc., a substantial quantity of cotton yarn, rubber hose, tyres, chemicals, vehicles, ready-made garments and various miscellaneous stores. Most of the purchases were made through the Department of Supply who rendered every assistance in matters of negotiations, placing of indents, transport etc. The Supply Department also arranged the interim financing pending recovery from the Exports Credits Guarantee Department of His Majesty's Treasury in London who were responsible for financing the transactions.

(4) **Russia.**—Along 8,000 miles of metalled highway across burning desert and barren land, through mountain passes 7,000 feet high, thousands of vehicles ran a 24-hour continuous service carrying supplies to Russia overland through Iraq and Iran. Operated by the Allied military personnel and with Allied equipment, fleets of lorries manned by British, Americans, Indians and Russians formed an endless stream of traffic.

Supplies had to be sent through Iran to the Caspian Sea and the same route had to be taken by everything coming to Russia by the southward routes from the United States. Since the summer of 1941 harbours and warehouse, railways and motor roads were built or enlarged so that a mere trickle of goods became a flood.

Enormous amount of material labour and technical supervision went also from India for the purpose of extending port and dock capacities.

Over 5,000 tons of vital war materials were sent from India to Russia during the first six months of 1944. Russia received quantities of gunny bags, tossa canvas, jute ropes, tea, pepper, tin, wolfram and silk, shellac and hides. Approximately 80,000 surgical instruments of indigenous production were supplied from India's first vintage. Two special consignments were 1,000 tons of nickel and 1,000 tons of harvest yarn, both of which reached Russia in record time.

Supplies to Russia were made in two ways. All war supplies were sent under Lease-Lend without any payment. Civil supplies were paid for, partly by Russian exports in England and partly by credit provided by the British Government to cover the balances since civil exports from Britain to Russia exceeded civil exports from Russia to Britain. In India, the United Kingdom Commercial Corporation bought supplies through the Supply Department and in the civil market for sending to Russia and goods worth Rs. 30 crores were supplied by this Corporation to Russia from India alone. The Corporation mostly purchased goods like gunny bags, jute ropes, sugar, tea, etc., etc., as already mentioned.

(5) **South Africa.**—Supplies to South Africa comprised buttons, hooks and eyes, cotton textiles, sand bags, etc.

(6) **Turkey.**—Cotton thread and yarn, heavy hides, 300 miles of eight-inch hume steel piping, road-making machinery, steel life boats, dock handling gear and steel, jute cloth and bags are some of the supplies made to Turkey.

(7) **Middle East.**—(a) *North Africa (excluding Egypt).*—The story of India's contribution to this Desert Victory (North African Victories) may be put in a nutshell by saying that long before the full force of American aid gave the promise of victory, she was almost wholly responsible for the supply of bulk stores to the Middle East—from railway wagons to landing craft, and electric torches to trouser buttons. Steel was also supplied from Indian workshops for the provision of water supply in the arid, waterless desert and the length of the water pipes alone would reach many thousands of miles.

Timber for railway sleepers, for jetties, lorries, vehicles, packing stores ammunition boxes, telegraph poles, and a hundred and one other uses came from India and it is estimated that India supplied all, or nearly all, of the Middle East requirements.

India also supplied many assault and self-propelling landing craft. An outstanding contribution was the supply of dry batteries and cells. Large quantities of camouflage paints, nets and hemp were also supplied.

Nearly 90 per cent of the tents which protected the troops from the torrid heat, the canvas and ground sheets which kept the pernicious sand out of the tanks, planes and motor vehicles, went from India. Indian pattern tents gradually replaced other pattern tents in the Middle East, while troops wore clothes made in India and, to a lesser extent, walked in boots supplied from Indian factories. And of the food they ate, a large proportion came from India; scientific dehydration, one of the first developments in India since the war, enabled India to supply 40,000 tons. Among medical stores, equipment and comforts for troops, India supplied over 50,000 stretchers, over 1,000,000

blankets, 250,000 mosquito nets, 1,500,000 water-testing tablets and 160 tons of anti-mosquito cream, to say nothing of 336,000 ounces of castor oil. 3,500 different items of medical stores were supplied from India and of field dressings, over 1,250,000 of the 2½ inch-wide bandages, which was part of the first aid equipment for every soldier in the field, would, if stretched from end to end, extend well over 2,000 miles.

(b) *Egypt*.—Egypt got telephone line equipment, bedding valises, steel hutting, nails, binding wire, telephone stores, rolled steel joints, mild steel sheets and angles, wire nails, re-inforcement bars, steel tanks and staging and road-rolling plants, soft timber, steel huts, black and galvanised steel wire, electric fans, army wire-mesh road track with pitches, road-making plants, steel sheets for bitumen containers and bridging cribs.

(c) *Other Middle East countries*.—The railways in Tanganyika were kept supplied with various types of broom brushes and items of uniform for railway employees. Vehicles and spare parts were sent to Iraq. Cotton textiles, coloured goods, jute, dressed leather and leather manufactures went to Kenya and Uganda, and fabricated sheet buildings to Palestine. Miscellaneous stores for Polish refugees, crockery, cutlery, pins, lamps etc., were shipped to Nairobi. Aden was supplied with sanitary ware, cement, various stores required by hospitals and municipalities, tyres and tubes, rubber sheets etc. Paints, linseed oil etc., were supplied to Suez Canal Company. Palestine was also provided with fabricated steel buildings.

(8) *Eastern Group Countries*.—Even before the establishment of the Eastern Group Supply Council, orders had begun to come in but these orders began to expand both in volume and variety with the setting of the Council. These orders comprised a host of textile items such as woollen and cotton garments, cloth, netting, blankets, hosiery, gloves, comforters, jute, hemp, fibre and sisal materials, canvas products, anti-gas stores, headwear, footwear (boots etc.), harness and saddlery (cordage, belting etc.), chemicals, timber stores, fire fighting equipment, rubber products, hardware stores and metal items, tools, weighing and sewing machines, pumps, jacks, winches and monkey grubbers, anchors, bollards, rowlocks, pulley blocks, metal scotches, skids, water and petrol tanks, cisterns, drums, metals containers, cylinders, plant and machinery, vehicles, fabricated buildings and structures, bridges, boilers, engines, petrol, diesel oil, etc., water supply and sanitary stores, transportation stores, e.g., barrows, culverts, diploories, trollies, trucks, etc., electrical and technical stores, viz., electric lamps, torches, generators, motors, charging sets, transformers etc., and miscellaneous stores, e.g., crockery, cutlery, musical instruments and components, strainers, funnels, oil cans, medical instruments and appliances etc. Orders for different types of articles were received from different countries.

Australia.—Textiles (khaki drill, sheeting, blue-grey, airmen's shirting, etc.), jute, hessian, cotton waste, jute webbing, anti-gas cloth and large quantities of electric cable for naval use.

New Zealand.—Textiles, webbing, towels and fannelettes.

Federated Malaya States and Straits Settlements.—Various items of police and military uniforms.

Burma.—Prior to its occupation by the Japanese and re-capture by the Allies, mostly items of police and military uniforms, handcuffs, locks, padlocks, food-stuffs etc., were sent.

Hong Kong.—Textiles, coal, etc.

Singapore.—Textiles, canvas, medical stores, etc., etc.

Ceylon.—Engineering stores, sand bags, road-making machinery and cement.

The above gives only a rough idea of stores supplied by the Department of Supply to various overseas Eastern Group countries.

CHAPTER LXXIII

INDIAN STATES CONTRIBUTION

From the very beginning of the war, the Indian States placed their resources at the disposal of the Paramount Power. The Princes made a declaration of their united support in the war, the declaration carrying behind it the strength of their entire resources and the grim determination of their loyal subjects. It said "The Chamber of Princes requests His Excellency the Crown Representative kindly to place before His Imperial Majesty, the King Emperor, the firm determination of the Ruling Princes and Chiefs of India to render every possible assistance in men, money and material to His Imperial Majesty and His Government in their heroic struggle for upholding the cause of justice and for maintaining the sacredness of Treaties and Covenants and prays that the united efforts of the Empire and the Allies may lead to the early and triumphant indication of the high principles for which His Imperial Majesty has been forced to take up arms against the enemies".

Since the above declaration was made, a number of transport, technical and garrison units were raised by the States for the Indian Army and all military resources were ungrudgingly offered. In short the Princes mobilised their resources in effective contribution to India's war effort and the Indian States shared with British India in industrial expansion for war purposes. The Secretariat of the Chamber of Princes made enquiries from all states regarding their existing and potential war industries and compiled a synopsis with a view to assist the war effort of the States. The Supply Department placed orders on the States for stores for which they had capacity.

A large quantity of war material was turned out by factories in Indian States and new factories were also set up to meet war requirements. Coal, metal, agricultural products, timber, mica, shellac, aluminium, saltpetre and other products were supplied by the States.

Details about the articles supplied by important States are given below:—

1. **Baroda.**—Messrs. Alembic Chemical Works supplied ether, sulphuric Acid, ether anaesthetics, chloral hydrate, epuedrine crystal, caffeine, ethyl chloride, trichloroacetic acid, nicotinic acid etc. Large orders for Ether Anaesthetics, Chloralis Hydras and Trichloroacetic acid were placed on this firm by the Supply Department. Orders for 2,500 pairs of sandals POW were placed with Director of Industries, Baroda, under the "small scale industries scheme". The State also supplied Mangalore tiles. The State workshops manufactured bitumen boilers, asphalt mixers and animal-drawn rollers. Orders for bore hole pumps and reciprocating pumps and for the construction of country craft and barges, were also placed in this State. Baroda was also engaged on maintenance and conversion of R. I. N. craft.

2. **Bhavnagar.**—Bhavnagar, supplied rubber goods and one secondhand road roller on payment. Orders for the construction of country craft and barges were also met.

3. **Bikaner.**—Stores such as Frame Riding Saddle, Pad Cotton Rear, Covers, Bags Grain Curvas 1st quality, Straps Chagul Tin, Stands Instruments Nos. 16, 19 and 21 were supplied and Machine Tools were given on loan.

4. **Chitral (N. W. F. P.).**—Antimony and arsenical ores are available in this State and were supplied.

5. **Cochin.**—Orders for supply of rope materials worth lakhs of rupees were placed with the Cochin and Travancore States. Mangalore tiles, wood-packing, levers etc., were also supplied. Orders for the construction of country craft and barges were also placed in this State.

6. **Faridkot.**—Orders for 5,000 gross of woodscrews per month representing the entire output of Faridkot State were placed with the Faridkot Screw Factory.

7. **Jodhpur.**—This State supplied sodium sulphate for paper production and hand-loom blankets. 25 Pdr. H. E. Shell, finish bore and rough turning were also supplied.

8. **Gondal.**—Gondal supplied six secondhand road rollers.

9. **Gwalior.**—Messrs. Gwalior Potteries Limited, supplied earthenware articles, e.g., urinal male, cup feeding, slabs, pots delf, stoneware jars etc. Buildings at Agra belonging to Gwalior State were given for the Clothing Factory. The Gwalior State supplied blankets for the Defence Service requirements. Industries such as crockery, stretchers, brushes and cement were also developed.

10. **Hyderabad (Deccan).**—The Government Industrial Laboratory, Hyderabad, supplied chloral hydrate at the rate of 200 lbs., per month. It also supplied sodium chloride, Thymol, Calcium Lactate, Butyl Alcohol and Acetone, Nicotonic acid, Paraldehydum etc. Another firm—Messrs. Hyderabad Starch Products, Limited, produced starch from Jowar and got 40 per cent. yield. Their production capacity was 15,000 tons. Amyl'm B. P. Orders for ether were placed with the Government Alcohol Factory, Kamareddy, Hyderabad. Orders for 161,000 pairs of laces leather were placed with the Director of Industries, Hyderabad. About 5,000 tailors were engaged for the fabrication of army clothing on behalf of the state-contractors. Buildings at Secunderabad belonging to the Hyderabad State were placed free of rent at the disposal of the Supply Department for their Clothing Factory.

The Hyderabad State supplied alcohol against Defence Services requirements and put up a sulphuric acid plant to produce fertilisers. Hand-loom blankets were also supplied. The production of milk bottles, brushes, knives cutting, cement and mangalore tiles was developed and used by the Supply Dept. Timber Articles such as helves, handles, axes pick etc., bellies and poles, sawn timber etc., etc. were also supplied. On the D.G.M.P. side, among the important items which were obtained from this State were 2" Mortar Weapon parts, Stand Instrument No. 28, Stand Lamp Helio, Clinometer Mk. IV., Clinometer Vickers M.G. Mk. 1. Moreover, a large factory for the manufacture of Bren guns was erected in the State.

11. **Indore.**—Messrs. Indore Oil Mills Limited, Indore, supplied castor oil (crude and refined). This was of much help as the Government of India wanted to encourage the use of vegetable oils as lubricants in place of Mineral oils, either as straight oils or blended with other mineral oils. Stretchers were also obtained from the State. The capacity of the two re-rolling mills in the State was also used.

12. **Jamnagar.**—Orders for 170,000 pairs of laces leather were placed with the Commissioner of Customs, Jamnagar, under the S.S.I. Scheme.

13. **Jaipur.**—There is a re-rolling mill in this State. The State supplied all kinds of non-ferrous bars, strips, castings and sheets for munitions work and gave two second hand road rollers to the Government.

14. **Kashmir.**—Kashmir is the chief market for Belladonna from which Atropine Sulphas and various other preparations are made. Large quantities

of Pyrethrum flowers, Santonine, etc., were also obtained. The turpentine production of the Northern India Resin and Turpentine Distributors, Lahore, was placed at the disposal of the Supply Department. Hand-made woollen cloth was also obtained. The resources of this State for the production of silk yarn required for the manufacture of parachute cloth were utilised to the maximum extent. Kashmir State also rendered valuable service in supplying Walnut and Maple half-wroughts for the manufacture of rifle furniture. In addition, another order for a very important item, viz., Bailey Bridge Chesses was placed in the same state.

15. **Kathiawar.**—This state supplied good quantity of crockery stores.*

16. **Keojarh.**—This State possesses vast quantities of first class iron ore which were mined by Tatas and two or three other companies. Upwards of three million tons per annum supplied to the Tata and Indian Iron Blast Furnaces and produce two million tons of pig iron per annum by these States of Mayurbhanj and Keojarh.

17. **Kutch.**—Orders were placed with firms for the construction of approximately 50 country craft and barges. These were distributed between Porbunder, Verawal, Baroda and Cochin States.

18. **Kundra.**—Kundra State supplied crockery and jelly moulds.

19. **Morvi.**—Pottery items, glassware and Mangalore tiles were supplied. This State also gave free of charge one second-hand road roller.

20. **Mayurbhanj State.**—Messrs. Mayurbhanj Glass Works Ltd., is a duplicate factory of the Scientific Indian Glass Co., Ltd., Calcutta, and were the main suppliers of neutral glass articles and Blood Transfusion Bottles and their whole production was consumed against Defence Services requirements. This State possesses vast quantities of first class iron ore which are mined by Tatas and two or three other companies.

21. **Mysore.**—The Department obtained some of sodii acetes and methyl alcohol pure from the Government Industrial and Testing Laboratory, Bangalore. Messrs. Mysore Chemicals and Fertilisers, Bhadravati, and Messrs. Mysore Iron and Steel Works, Bhadravati, produce chlorosulphonic acid and the Department obtained its requirements from these sources. Supplies of sulphuric acid and anhydrous ammonia were obtained. Quite a large number of tent poles were obtained. Thousands of tons of ballies, poles, round timber and sawn timber were supplied. The resources of the State for production of silk yarn were also utilised. This State also contributed a lot on the Munitions side. The State authorities own a complete Iron and Steel Works plant producing Charcoal Pig Iron and about 24,000 tons of steel per annum. This is subsequently rolled in their own mills into bars and structurals of which distribution was controlled by the Iron and Steel Controller. The State also made quantities of Cast Iron Pipes and some of its high-grade iron was used for making machinery castings. A second 25-ton steel furnace was erected by the State and increased their steel output. They also installed two electric furnaces which are making Ferro-Silicon for steel making and these furnaces meet half the total demands of India. Messrs. Kirloskar Limited, Harihar, were wholly engaged on machine tool production. Mysore Electric Factory, Bangalore, produced special portable "Field" Lathes and watch-makers Lathes against orders planned by the Machine Tool Controller. The State supplied Plotter Visual Table Chart.

22. **Patiala.**—Patiala supplied hand-loom blankets. Four re-rolling mills were engaged in rolling steel sections like small rounds and flats from various kinds of raw materials..

23. **Porbandhar.**—Orders were placed for the construction of country craft and barges.

24. **Rampur.**—Large quantities of Ether Anaesthetic were obtained. Hand-loom blankets were also supplied.

25. **Saraikela.**—Refractory material was supplied for use in Tatas' Steel-making furnaces.

26. **Travancore.**—Travancore supplied rubber manufactured goods worth several lakhs of rupees. Titanium Dioxide Pigment required for paints and titanium tetrachloride was also supplied. Orders valued at half a crore of rupees were placed for the supply of various types of rope materials. Plymra Fibre Brushes and Mangalore Tiles were also supplied.

27. **Miscellaneous.**—Besides, many other states supplied different kinds of stores under the S.S.I. Scheme and assisted in other ways such as engaging of tailors for the fabrication of army clothing, supply of timber etc., for instance, Bhopal supplied strawboard products; Chamba sawn timber; Dholpur tailors for the Clothing Factory; Dangs tons of ballies and poles; Jodhpur handloom blankets; Kapurthala tailors for Clothing Factory; Malearkotla and Nabha hand-loom blankets; Tehri-Garhwal bellies and poles; etc., etc.

CHAPTER LXXIV

POLICY AND PROCEDURE OF REGISTRATION OF CONTRACTORS

It was the established practice of the late Indian Stores Department and the Contracts Directorate—the two purchasing agencies of the Government of India—to make purchases from firms on the list of approved contractors kept by them. The contractors for the supply of stores to the Indian Stores Department were registered in the Intelligence Section in the headquarters office. The firms were brought on to the approved lists if their applications were recommended by the Controller of Purchase and Inspectorate of the areas appointed by the Central Government or where the areas were without such authorities, on the recommendations of the Directors of Industries of the local Governments and Indian States. The registration in the Contracts Directorate was based mainly on satisfactory report by the Police.

When the Purchase Branch was re-organised on 1st July 1941 and the office of the Chief Administrative Officer (Purchase Branch) created, the registration of contractors was centralised in his office. He continued to be the registration authority till the 5th May 1944 when his post came to an end. Registration of firms was then entrusted to the Chief Registration Officer which office remained attached to the Main Secretariat till the 1st May 1946 when it was transferred to the DG(I&S).

Registration of firms.—In the beginning (about 1941) the undermentioned conditions were laid down as governing factors for the registration of firms as “approved contractors” :—

- (a) Satisfactory report by the C.G.I. or the Controller of Supplies as to the premises and the working capacity of the firm;
- (b) Reports by the civil authorities as to the status and general financial condition of the firms; and
- (c) reports by the police as to the record of the partners of the firm in the criminal or political branches.

Reports from the civil and police authorities were later on dispensed with to avoid delay. The financial position of a firm was, however, ascertained from the bankers and where a contractor had no banking account from the civil authorities. No fees were levied for registration. A complete and up-to-date list of approved contractors was maintained in the Trade Books by the office of the late C.A.O.(P) and then by the office of the C.R.O. and also by all Purchase Organisations. All additions and alterations were periodically reported by the C.R.O. to the purchase branches.

Removal of “approved” firms from the lists.—The approved firms remained on the lists without limit of time but could be removed without notice for any of the following reasons :—

- (a) Failure in tendering to observe the instructions given in tender forms including schedules thereto;
- (b) failure to quote in response to invitation to tender on four successive occasions;
- (c) submission of four successive quotations fifty per cent. or more above the quotations ultimately accepted;
- (d) failure to secure a contract after twelve successive tenders had been submitted or during the period of three years whichever is less;
- (e) failure to perform a contract or contracts satisfactorily and in accordance with the contractual obligations; and

- (f) any grounds which, in the opinion of the head of the Purchasing Organisation and/or the Chief Registration Officer rendered the retention of the contractor's name on the list of approved contractors undesirable in the public interest.

Names removed were communicated by the Chief Registration Officer to the purchase branches and they noted in their Trade Books.

Punishment more severe than removal of names from the lists of approved contractors, i.e., "Blacklisting", "Banning" and "Suspension of contracts" could also be imposed, on the firms when they were found guilty of mal-practices like bribery, corruption, etc. They could be blacklisted for a limited or an indefinite period or could be banned for a specific period. All this involved an immediate cessation of business with the Supply Department. When a *prima facie* case of corruption came to notice, business with the firm was suspended pending final decision. All cases in which blacklisting or "banning" of firms were indicated were reported by the Purchase sections with full details to the C.R.O. for investigation and report to Government. Orders regarding "black listing" or "banning" were normally communicated to the firms while the "suspension" orders were kept confidential.

The number of firms registered, removed from approved list, black-listed, etc., year by year is given below:

Year	No. of firms registered	No. of firms removed totally	No. of firms blacklisted
Up to 1941	4,596	27	5 (1 in 1940 & 4 in 1941).
1942	2,058	364	5
1943	1,942	417	25
1944	774	442	9
1945	83	77	2
upto July 1946	31	456	5

Restriction on registration of new contractors.—In November 1944 the Government of India decided to tighten up the procedure for registration and to undertake a comprehensive review to eliminate inefficient or otherwise unsuitable firms. The registration of new contractors was suspended except in the following cases:—

- contractors already on the approved list of the C.R.O. might be registered for additional items of stores, if found suitable;
- New contractors might be registered provided the additional capacity for the store in question was certified to be necessary for the prosecution of the war or for obtaining more competitive rates.
- A firm applying for registration for a store for which, in the province of location of the applicant, there was nil or inadequate registered capacity, might be registered provided it was otherwise suitable and provided further it could produce the store at a reasonable cost and without undue strain on transport.

The review of existing contractors was taken up by the CCP(S) and CCP(M) in consultation with Planning and Finance officers with the help of the Trade

Books and from the inspection reports. The contractors were divided in three following categories:—

- (a) those contractors whose capacity and performance was above board and who must continue to be retained on the approved list;
- (b) those contractors who were either bogus or inefficient or had not done any business with the Supply Department for a period of years; and
- (c) others.

Those falling in category (a) were allowed to continue to be on the approved list and those in (b) were summarily removed while those in category (c) were to be re-considered by the C.R.O. in accordance with the policy laid down in respect of fresh applicants: The number of registered contractors on 1st August 1946 was 5,939. This excludes 952 firms which were registered by the late Supply Department but were later transferred to the Department of Food and Textile Commissioner, Bombay, as a result of transfer of the control of certain items.

Business with unregistered firms.—The placing of contracts with the approved contractors had various advantages but during the war great latitude had to be given to the Purchase Organisations to have dealing with unregistered firms with the main object of exploring indigenous capacity. This was allowed in the following cases with the specific approval of an officer not below the rank of a Controller of Purchase/Controller of Supplies:—

- (i) Against advertised tenders;
- (ii) Against planned indents where existing capacity of firms registered for the store was limited and it had been definitely ascertained that the firms on whom the indent had been placed were in a position to manufacture and supply the articles required;
- (iii) Educational orders the value of which should not ordinarily exceed Rs. 1,000;
- (iv) Purchases of small value ex-ready stocks against demands for local indentors.
- (v) Against urgent demands for proprietary articles which could be manufactured and supplied by a particular firm;
- (vi) Purchases of second-hand plant and machinery.

Normally enquiries against a demand were issued to all firms registered for a particular store, except in the case of demands below Rs. 5,000 in value. When only a few selected firms were addressed, financial concurrence was necessary. In cases of new stores for which there were no registered firms or a very limited number of registered firms, a provisional list of firms, which were brought to the notice of Purchase Officer by Planning Directorates, indentors and Inspectors etc., was prepared.

Purchase by negotiated contracts.—These were restored to in cases in which stores could not be procured by normal methods of purchase by tenders, reasons for this special method being clearly recorded.

Registration of foreign firms.—An approved list of manufacturers of important plant, machinery and iron and steel works, possessing workshop and appliances capable of turning out work of the desired standard was maintained by the late Indian Stores Department. The list showed names of manufacturers in India and abroad (with names of accredited agents in India). During the war due to obvious reasons, this list of overseas firms was kept in abeyance.

Registration in post-war period.—Registration of contractors in future will depend much on the general purchase policy of the Government of India. An O.S.D. was recently appointed and the whole question is under consideration.

CHAPTER LXXV

WAR-TIME "ADVENTURES" IN INDUSTRY.

After the disaster at Dunkirk, England had to switch a great part of her industrial potential from peace to war work almost overnight. It was improvise or capitulate. Improvisation is to the British factory man as compromise is to the British politician. Britain's long experience as the workshop of the world stood her in better stead and made rapid improvisation easier. The sweet people were busy making breech mechanisms and respirators, and from the razor-blade factories Oerlikon shells and tools and gauges were pouring. Factories that had made almost priceless carpets turned to producing very modest-priced camouflage netting. The football-pool promoters used their huge premises to pack parachute containers and build storm-boats. Flares came in uniform Government cardboard boxes from works which formerly sent out exotic perfumes in elaborate packings. Stocking manufacturers made Bofors gun parts. And if the playroom went short of toys it was because a doll factory was busily producing thousands of a device which saved the lives of merchant seaman, and a toy manufacturer was making Stens instead of pop-guns. In India while improvisation was not on such a grand scale, the war activity did help to break down traditional "grooves" in her factory land and helped to measure in terms of time and values, of mass production, of planning to schedules, working to capacity and making the most of existing resources.

Improvisation, without doubt, did provide "adventures" in the field of industry as lively as in any story book. Here are a few examples—

In the field of labour, opportunities were created and new avenues opened which cut across the traditional grooves of employment. A firm in India which formerly made weighing machines made steam presses during the war. Sugar mills used spare capacity to make ambulance stretchers or "cure" potatoes. Jute mills made shell cases, cotton mills made machine-gun belts, a telephone company made air raid sirens. Railway workshops produced munitions.

Among workers, jewellers accustomed to gold and silver tried their hand at drawing fine lengths of the "base" copper for motors and dynamos; watch-makers applied their knowledge to repair of the more complicated instruments of aircraft which guided our pilots in the fathomless ether, college students learned to rely equally on their hands and picked up a valuable trade as precision instrument makers. In many small rubber factories, apparently crude instruments turned out finished rubber gloves and various rubber stores such as hose pipes to incredible perfection; in the villages, women helped men to make camouflage nets, or knives or forks or sandals by the million.

In every factory, the scrap room became as important as the stock pile and salvage experts used ingenuity and skill to re-claim from the apparent waste the means of further production.

Here was a paradox—output was measured in terms of millions but for groups of men in every factory—the munitions inspectors—specifications must still run true to the millionth part. A small skirmish on the border may cost scores of hand grenades in a couple of hours, but in the factory each hand grenade was a work of precision and passed through a chain of inspectors measuring to exact thousands.

Wealth in Waste.—One of the most remarkable results of the grim struggle was the collection and disposal, in the belligerent countries, of waste of all kinds and descriptions. It is true that even before the war many waste products were being economically exploited; in fact the success of an industrial concern sometimes depended upon the ability of its technical experts to turn

the waste materials into useful articles. These processes, however, were generally confined to industrial wastes obtained in large factories, while the common waste materials, thrown away by the citizens as rubbish, were ignored owing to their insignificance or dirt-cheapness. Wrappers, containers, jars, bottles, small boxes, pieces of string, cable and wire, old calendars and shoes, useless knives, forks and tin-openers, etc., were consigned to the dust bin and ultimately found their way to the rubbish heap, where they were either incarcerated or allowed to rot or rust away as un-reclaimable waste. The war, however, changed all this, and, through sheer force of circumstances and within the twinkling of an eye, so to say, complete processes were perfected for winnowing wealth out of waste. The belligerent countries wanted all their available means of transport—ships, railways, lorries—for carrying essential supplies, war materials and the fighting services. Moreover, with the staggering expenditure of modern warfare, it was essential, in the national interests, that the resources of the country should be conserved to the fullest possible extent. It was estimated that in England millions of pounds worth of goods were manufactured from rubbish materials which were once regarded as worthless.

It is true no such effort on a very large scale was made in India, although some effort here and there was made. Salvaged material and scrap was being collected and used in various industries. Tin plates scraps were used for making substitutes for nails and for buttons. Many other substitutes for materials like glass, shellac, cork, tinsplate, fibres, enamels, rubber etc., were evolved and the force of circumstances compelled the country to use even the materials hitherto considered as waste to the best use.

The war has a way of upsetting cut and dried plans and estimates. Improvements both in offensive and defensive equipment are being thought out on both sides of the battle line. Weapons and ammunition regarded as satisfactory may almost without warning be classed as obsolescent. The broad plan as it leaves the General Headquarters to the Supply Department as firm demand is the best possible interpretation of strategic intentions as they appear at the time. But they are subject to more or less violent changes. Such is war. Industry has, therefore, to adjust itself to these changes.

**PART V.—AFTER—MATH OF WAR, PROBLEMS OF TRANSI-
TION AND RECONVERSION.**

INTRODUCTION

From the economic point of view, wars end with a startling suddenness. There can be no let down until the war is won and then the bulk of the war activity becomes unnecessary. A war economy disrupts the forces prevailing in normal peace-time. Important changes take place in the economic structure. In prewar days, economic and financial problems were in the forefront, but during war-time there was a movement from these to technical problems. Most industries associated with war had no marketing problems, no fear of competition, had very little worry about costs etc. The whole emphasis of their problems was technical—how to produce new types of finished products with inferior equipment, labour and material. There was a steady extension of Government itself into the field of industry. Government was the main buyer for the goods of industry. It controlled and supplied raw materials and made trained labour available. Briefly, the changes in the Indian economic structure have been far reaching and are:—

- (a) From the point of view of agricultural production, there has not been much change except perhaps a slight shift from the production of raw materials and non-food crops like cotton, jute and certain oil seeds to the production of food crops like wheat and rice.
- (b) As far as the main pre-war industries like cotton textiles, jute, coal, tea, sugar and matches are concerned, the change in production is practically negligible. Some other industries like iron and steel, cement, paper, woollen textiles, sulphuric acid, paints, products of breweries and distilleries have, however, achieved some increase in output; while there has been an appreciable increase in the number of small engineering establishments and in the variety and volume of work done by them. Ordnance Factories have increased in large number and production of munitions, and army equipment like clothing, tentage and leather goods has risen many times over their pre-war levels.
- (c) The cessation or curtailment of imports brought about a rise in the output of certain industries, viz., glass, electric bulbs and fans, canned food, biscuits and confectionery, pharmaceuticals and drugs, surgical instruments and appliances, heavy and fine chemicals.
- (d) Owing to the ban on trading with enemy countries, conservation of essential stores for war and civil purposes and operation of exchange controls, the composition of foreign trade has also undergone a significant alteration in the direction of an increase in the exports of manufactured goods and a substantial fall in the imports of manufactured together with a rise in the imports of raw materials. At the same time there has been a fall in the imports of machinery and industrial equipment.
- (e) Employment in the country has increased substantially since the outbreak of war.

- (f) Wages of industrial labour have gone up. The number of skilled workers has recorded an appreciable rise partly on account of the increase in engineering establishments and partly on account of Government's strenuous efforts to add to the desperately low technical talent available in the country.
- (g) India has ceased to be a debtor country as far as her public indebtedness in terms of sterling is concerned.
- (h) The railway as well as industrial equipments have been used to a limit never witnessed before in Indian history.
- (i) Prices have shot up tremendously; in some cases having gone up so much so by more than 300 per cent.

From the above it will be seen that the changes are not all of the same character. Some are obviously temporary like the rise in prices, the increase in employment, the enforced reduction in imports and the enforced postponement of the demand for capital goods and these create what are usually known as the problems of transition from a war-time to peace-time economy. There are some other changes which are likely to be more permanent such as the conversion of India from a debtor to a creditor country, the increase in her public expenditure, and the expansion in the steel and in the light engineering industries; these are influencing the post-war trends in trade, public finance and economic development.

V-Day—the day of victory and the resumption of peace-time responsibilities,—brought with it a crucial interval—the transition period. Between the new peak to which the country's production has been lifted under the spur of war and the plateau of full employment, there lies the hazard of this transition period. This period is concerned with problems of demobilisation, unemployment, liquidation of war production, reconversion of war-time industries to peace-time use, re-habilitation of consumption goods industries, relaxation and ultimate removal or modification of war-time controls, disposal of war-time surpluses, war plants and equipment, the movement towards a more level of prices and changes in the levels of exchange and taxation. All these problems require the most careful handling, if the end of the war is not to be followed by social unrest, renewed profiteering and acute economic distress for the vast masses of the country. How these matters are handled will have a vital bearing on our ability to attain and maintain high levels of production and employment.

We have won the war. We dare not lose the peace. The cost of our victory has been an immeasurable one in terms of personal loss and suffering, but have we not emerged the richer for it—richer in wisdom and understanding. We can by our united efforts share in shaping our destiny. This leads us to post-war reconstruction. Success in this period will more and more be measured by the scope of our industrial development and production. The objective of post-war reconstruction is to carry out the obligations which the Indian people are placing upon their Government to see that the full employment of war-time is preserved, that social needs, such as housing programmes and national works are carried out and to generally contribute to the rising standard of living. Most of our industrial development had perforce to be devoted to war requirements, but it is not too much to hope that the ingenuity and resources which enabled India to make her own ships, guns, aeroplane parts, munitions and thousand other stores required for war—not forgetting the machine tools with which to make them—will not fail her now that that ingenuity must be turned to the healing and rehabilitation of natural life.

The Supply Department which played such an important part in the war is not going to play a less important role during peace-time. It has already given birth to a new Department of Industries and Supplies and Industrial development is one of its main functions now. The Directorate General of Industries and Supplies has set to work on this phase whole-heartedly. The great strides already made in industries are being rated at their true value. The developments during war have mostly been devoted to means of destruction; fortunately while the cause passes the results remain with us, to be converted to the betterment, health and happiness of the mankind. The war years have bequeathed to us the plant and executive organisation, the technical knowledge, craftsmanship and the confidence born of successful results. Nothing is lacking. Full advantage can now be taken of recent developments in India's perennial resources—her manpower and her means of production.

The succeeding chapters show how the Government of India and the new Department of Industries and Supplies are tackling these important problems.

CHAPTER LXXVI

RE-CONVERSION OF INDUSTRY FROM WAR TO PEACE

From war economy with its controls, its emphasis on the production of military goods, its diversion of resources from civilian to defence purposes, its mobilisation of the man-power of the country for war purposes, and the manifold reactions that such measures produce in the Nation's economic life, to a peace economy, cannot obviously be brought about by one sudden single stroke of the pen of even of the Executive Council. The problem becomes even more difficult when one's objective is, as in the case of India, not a mere return to the pre-war peace economy, but the attainment of a new peace economy, which would also be a planned economy intended to bring about a substantial rise in the pre-war standard of living of the people. This period is a testing time. The task ahead demands a full scale national effort in which Government, industry and all sections of the community must co-operate to consolidate the country's position as a nation, grasp opportunities for development and guarantee happiness for the people.

Certain types of activity considered highly productive during war cease to have any value on the declaration of peace. Ordnance Factories producing machine guns, bullets, rifles, etc.; have to stop working; factories making articles like tents, parachute silk and similar goods also stop; as regards factories and other producing units supplying articles like cloth, leather goods, dehydrated vegetables and meat, other foods, etc., the demand for these is dependent upon the current strength of the armed forces, and the pace at which demobilisation is proceeded with. The problems directly brought about by the cessation of war are—(a) unemployment owing to stoppage of ordnance and other factories; (b) demobilisation by the army; (c) re-conversion to civilian use of factories engaged in war production; and (d) re-employment of demobilised personnel and workers released from the war factories by schemes of new employment, such as road, public works, etc.

Even before the end of war, the Government of India was fully alive to these problems. Although it was impossible to predict the date of cessation of hostilities, Government examined the preliminary arrangements for re-conversion of industry from war to peace. In the first place the process of "unwinding" was likely to be, initially, a gradual one, with certain lines of war production tapering off, and the undertakings concerned reverting to civil production. In the second place, over a wide range, industries or undertakings would be anxious to revert to normal peace-time conditions and trade channels as early as possible, with as much relaxation of official "controls" as possible. Thirdly, in respect of industries which sprang up or expanded as a result of the demand for war supplies, there were some which would have to find their own peace-time level of production having regard to peace-time requirement in respect of quality, price, etc., for example, the crockery industry. From this class, however, it was necessary to distinguish those industries which had been specially fostered during the war, either with a promise of protection in some form, or with other assistance, because their establishment or survival is required in the interests of Indian Industrial development.

A primary object of "re-conversion" is to avoid a hiatus and avoidable unemployment when a "switch" takes place. It is important, therefore, to assess an industry's requirements of its own materials and "basic" requirements of coal, steel, cement, etc., and as far as possible to see that the industry does not lose its existing source of supply, even though these may continue limited. The problem of re-conversion thus seemed to be (1) how to plan the whole or partial re-conversion of undertakings and industries in instances of a

kind likely to be thrown up with the end of war, and (2) how to plan for an industry taking its normal peace-time place, but with the fullest possible use of its war-time expansion or development. So it was essential to ascertain—

(a) what civil production, industries and undertakings of the kind indicated working for the Supply Department were best suited to undertake or were capable of undertaking; and

(b) what assistance they would require in the way of making materials and personnel available, in the maintenance or modification of controls, etc.? The special problems to be studied in regard to each industry were—

(1) whether a reconstruction problem existed at all in them;

(2) what reconstruction measures were appropriate in each case; and

(3) what specific action Supply Department must take.

Basically, reconversion was a problem for industries themselves, Government's main function being to "hold the ring", giving assistance wherever necessary in regard to bottlenecks like transportation, supply of raw materials like coal, relaxation or enforcement of controls etc. The reconversion problem before the Supply Department was then to be approached in the strict sense, i.e., what was described as the "sword to ploughshare" transition. Supply Department avoided any attempt to act as general nurse-maid but concentrated on the specific problems of reconversion in this sense. The measures adopted by the Supply Department are given below:—

(a) The war-time increase in industrial employment comprises (1) factories and (2) cottage industries. Figures of average daily number of workers in the factories from 1939 to 1943 reveal only the small increase of $\frac{1}{4}$ million in the factory rolls. In 1939, there were 1,751,137 workers, in 1943 2,437,246 an addition of 686,100 men. The distribution of the increase in workers among the different industries gave some idea of the nature of the re-conversion needed. Among the Government factories, clothing showed an increase in 1939-44 of 27,000 workers, ordnance 100,000 and Railway workshops 37,000. Among private factories, Textile accounted for 185,000 men, Engineering 106,000; Minerals and Metals 38,000; Food, Drink and Tobacco 31,000; Chemicals, Paper and Printing, Skins and Hides, etc., recorded increases varying from 20,000 to 40,000 persons. With the exception of ordnance factories and certain engineering works of a purely war character, which accounted only for the smaller part of increased factory employment, the rest consisting for the most part of civilian industries, presented, so far as peace-time policy was concerned, largely the problem of maintaining production and employment.

(b) The industries can be divided into two parts (a) Producer goods industries and (b) Consumer goods industries. Under the first come Iron and Steel, Engineering (General, Structural and Mechanical), Machine Tools, Non-ferrous metals and other industries such as Chemicals, Timber, Coal, Cement, etc., and the latter includes woollen, clothing, glass, soap, electrical goods, cycles, cutlery, crockery, etc. In case of producer goods industries, war industries and productive capacities turned over to defence entail technological reconversion, especially in the ordnance and engineering factories. This question of re-tooling and re-conditioning has been examined by departmental committees but the degree of re-conditioning required is not so far-reaching and extensive in India, as say, in U.K. and U.S.A. The re-conversion and switching over of the capacity of the Ordnance Factories to the civil use is given in a separate chapter "Future of Ordnance Factories". A large amount of capacity is being devoted to the production of machine tools and materials needed for industrial expansion. Machine tool industry is a war-time product, and the problem is more one of planning its development, to keep in step with reconversion of other industries and with post-war industrial development, than of re-conversion.

Re-conversion in the iron and steel and engineering industries and the non-ferrous metal industries thus seems not only the release of productive capacity, but also of vast quantities of steel, and available quantities of other metals such as tin, lead, copper, brass, aluminium, etc. Among other materials might be mentioned cement, chemicals, timber, coal and electrical power. Increased production of cement can easily be used up for construction works of various types being launched. Similarly increased production of sulphuric acid, bichromates and chemicals such as alums, sodium sulphide and fine chemicals such as coal tar products, glycerine, etc., can be also easily utilised.

With regard to consumer goods industries, among the major organised industries such as sugar, cotton textiles, re-conversion in the technological sense implies only replacement of machinery and not reconditioning in any mentionable measure. Production was developed in other important industries such as leather, woollen, soap, glass, paints, electrical goods, cycles, etc. Re-conversion does not present any serious problems in case of these industries.

(c) An important measure of assistance in re-conversion is the grant of protection to war-time industries to which assurance was given. This matter falls into a field of high policy and the industries have already represented to the Tariff Board. The second important measure of aid in industrial re-conversion is action in regard to tax relief for depreciation, replacement, repairs and research. These matters are for Finance Department. Another measure of re-conversion aid is the expeditious release of adequate quantities of raw materials such as steel, coal, timber, rubber, chemicals, cement, etc., and fabricating capacity. The Department has been providing the material as well as securing transport priority etc. and this practice is being continued. It is clear that reconversion problems dovetail into those of the post-war development and in many cases they are being tackled along with the development of industries by the Panels set up by Government. Another measure of Government assistance in re-conversion is the co-ordination of their peace-time purchase policy with industrial production encouraged in war. The very idea of putting Supplies and Development of Industries under one head (D.G.I.&S.) shows that this co-ordination is being aimed at.

CHAPTER LXXVII

CANCELLATION OF CONTRACTS AND LIQUIDATION OF WAR PRODUCTION

(a) **Cancellation of War Contracts.**—The order of cancellations needs to be determined in the light of local conditions, the post-war uses of the product, the equities between competing firms, and the consequences of cutting off employments. Policies for the settlement of terminated contracts must take into consideration the necessity of freeing the war plants for peace-time pursuits, of speedy removal and storage of government-owned equipment, and of making needed materials available for civilian production.

It was necessary even before the end of war to frame some policy regarding the cancellation of war contracts on the cessation of demands of the Defence Services. When the demands ceased, or were substantially reduced, it was necessary to take action to cancel the contracts either wholly or in part, and thus reduce the financial liability of Government and conserve raw materials by stopping the production of unwanted military goods. The Department, however, was not in a position to take such action without a direction from the indentors to that effect. If, however, the indentors scrutinised all outstanding indents only after hostilities ceased, it would take them several months to prepare comprehensive statements showing the extent of reduction in the outstanding indents with the result that the manufacture of unwanted goods would continue, and the financial loss to Government and also the loss of much-needed raw materials would be great. It was, therefore, essential that the Supply Department should be in a position to initiate action, immediately on the occurrence of particular changes in the progress of war, to cancel contracts or reduce quantities on order, without having to wait for specific instructions from indentors on each individual indent. Indenting officers were, therefore, requested to furnish the Directorates General with statements showing outstanding indents and indicating the extent to which the quantities could be reduced on the occurrence of certain changes in the war situation. They were asked to classify all stores into three categories—(a) those definitely required; (b) those not wanted; and (c) those that might be required and to re-classify stores in (c) into (i) and (ii) at a later stage.

When these statements were furnished, all action required to terminate the commitments of Government to the maximum extent possible in the case of all goods not classified under the first category was to be taken by the Directorates General in advance. Instructions were also issued to all Purchase and Planning Officers not to place any new contracts or demands for reserve stocks after V-J Day. It was also decided that the 'Break Clause' which already existed in all Standard Contracts should not be invoked in contracts the total value of which was below Rs. 50,000. In order to reduce the commitments and limit the loss which Government would have to suffer in terminating long-term contracts, it was decided that individual contracts should not commit Government to more than three months' requirements at a time and the period of notice under the 'Break Clause' should not exceed one month unless effective period of production exceeded one month. A correct appreciation was to be made of the amount of work that was likely to be involved when the contracts were required to be terminated *en masse*. As regards imported stores, it was decided that lists of imported goods classified into categories, the shipment of which required to be continued and those which could be stopped on V-J Day, should be prepared.

An Officer on Special Duty (Contracts) was appointed in Main Secretariat to prepare a factual analysis of the nature and extent of the commitments arising out of long term contracts made by the Procurement Agencies of the Supply Department, to examine existing contracts whether they contained the break clause or not in order to determine the nature of the commitments, to make a forecast of the types and quantities of finished goods, components, raw materials etc., to ascertain from the Directorates General the possibilities of making alterations in existing contracts and/or specifications which would have the result of reducing the quantity and/or value of surplus finished goods, components, raw materials, etc., to draw up periodical reports for the Director General of Disposals suggesting inter-alia action by procurement agencies etc., and to consider how claims for compensation under the 'Break Clause' should be examined. With a view to ensure that the instructions issued in regard to the cancellation etc., of contracts were rigidly enforced, a Special Check Section was set up in July 1945 in each of the two Directorates General of Munitions Production and Supply.

It was also decided that as soon as hostilities with Japan ended, Directorates General, etc., would take immediate and effective steps for reducing or cancelling the quantities of stores against various contracts and ensuring the equitable and, as far as possible, uniform settlement of terminated contracts. For this purpose, Committees having representatives of Planning, Purchase and Finance were formed in the various Directorates General to decide to what extent the object could be achieved by cancelling time-expired contracts and/or by the application of the 'Break Clause.' The principles to be followed in deciding this were:—

- (a) If the contract delivery date had expired and the responsibility of the contractor for the delay was absolute, the contract should be cancelled without any liability on Government.
- (b) When a store for which more than one contract was placed was required in reduced quantities, only those contracts the cancellation of which was likely to be more advantageous to Government should be cancelled.
- (c) Contracts should be determined under the Break Clause by giving the contractor notice for the period agreed upon in each contract and requiring him to slow down the rate of production as rapidly as possible in accordance with the Standard Break Clause.
- (d) When the bulk of a store had already been delivered and only a small percentage remained to be supplied or when the delivery date was to expire within a short period, the contract should be allowed to run its course but no store might be accepted after the contract delivery date.
- (e) If the store was not required and was of such a nature that its disposal would be difficult, contract still current should be determined even when it was not subject to the Break Clause, as it might be cheaper to meet claims for compensation than to allow the contract to run its course.

When the contract delivery date had not expired and the contract was terminated for no default on the part of the contractor or when the 'Break Clause' was applied, all claims by contractors or counter-claims by Government were to be settled equitably and speedily, if necessary, by negotiation with the contractors. Committees dealt with claims for partly fabricated stores, raw materials and bought-out materials, other than stores fully completed and accepted by the Inspection for payment in terms of the contract. In the case of raw materials issued to contractors at controlled or concessional rates or free of charge and provided any of these raw materials were not in short supply

and not required for the production of stores against other contracts still alive, the Committee could agree to allow the contractors to retain the raw materials at controlled rates, provided also such a step led to the quick settlement of terminated contracts. The Committees could also authorise 'on account' payments to contractors in really hard cases.

The Special Check Sections established in July 1945 were abolished with effect from 1st November 1945 as the main task for which they were created had been accomplished and as the Purchase Organisations had become familiar with the problems arising from reduction in demands and cancellation of contracts.

On V-J Day immediate orders were issued in respect of Defence Service demands to suspend forthwith all further action on 1946 demands, to translate no "unplaced" indents of 1945 exceeding Rs. 10,000 in value into contracts except after mutual discussion between Planning, Purchase and Finance and that too only to the extent justified by the indentors' revised demands.

The Committees constituted as above continued to function very well for some months and dealt with a large number of cancellations of and reductions in demands. As, however, the Planning Directorates were gradually wound up and most of the Directors and other Planning Officers left, the Committees could not function in case of Directorates which were wound up and or amalgamated with Purchase. In March 1946, it was decided that all cancellations and or reductions in demands received after 1st April 1946 should not be treated as V-J Cancellations but dealt with in the normal manner.

As this work could not be dealt with by the Supply Officers in addition to their normal duties, a Special Committee, to be presided over by a Judge and assisted by a Deputy Financial Adviser and a Purchase Officer, was constituted to deal with all the remaining cancellation cases, whether pertaining to Delhi or Calcutta. Reduction demands received up to 6th July 1946 represented 10,528 items valued at Rs. 25.77 crores and the number of items finally settled up to that date cover 9,642 items the value of which is Rs. 22.55 crores. Total compensation amounting to Rs. 9.76 lakhs has been paid in respect of items finally settled.

(b) **Liquidation of War Production.**—Since the beginning of the war Government had, from time to time, under agreements with a large number of contractors, provided balancing equipment, extension to buildings, installations, etc., free of charge or at concessional rates. In the agreements made with the contractors, provision was, however, made for the liquidation of such Government-owned equipment either by allowing the contractor to retain it at a price to be mutually agreed upon or by Government and or removing the equipment from the contractors' premises within the time stipulated. The onus of taking the initiative, however, rested with the Supply Department.

In D.G.M.P. the manufacture of real munitions in civil and railway workshops substantially ceased early in 1945. Moreover, as a result of the Hydari Mission, it was decided that over a period of eight months, the munitions production of Ordnance Factories should work down to a specified peace level. Also 75 per cent of the Engineer-in-Chief's structural programme was cancelled about June 1945. Thus V-J Day found the D.G.M.P. already committed to a substantial contraction of the two main elements of his production, i.e., munitions and structural. Of the remainder, war cancellations substantially affected light and general engineering.

The D.G.M.P. exercised very extensive controls over materials and production. He arranged the monopoly import of all non-ferrous metals and effectively controlled by agency system practically all other goods of an engineering nature. Through the "Panel" import system all the machinery and stores required by industry as a whole, and not merely for war purposes, were handled and the

auxiliaries and accessories similarly treated under the Imported Engineer Stores Control Order. He also regulated much of India's production by the Factories (Control of Production) Order.

The substantial contraction which included the real munitions of war was already going on and continued. Gradually controls mentioned above began to be relaxed. As regards other organisations while many controls existed, controls over raw materials and production were not so extensive as in the case of D.G.M.P. Liquidation of war production in Clothing, Harness and Saddlery Factories was not such a formidable task as in the case of Ordnance Factories. Disposal of surplus stores also presented lesser problems in other organisations than in the D.G.M.P.

With the cessation of hostilities, all Branch Offices were ordered to bring all records and statements, etc., maintained by them up to date and initiate action to negotiate with contractors in accordance with agreements entered into with them. Final settlement with contractors as regards equipment, etc., owned by Government of India, not exceeding Rs. 5 lakhs in each case, could be made in accordance with the agreements entered into with them; but, in the case of equipment owned by the Government of India exceeding this amount in value, and in the case of equipment owned by H.M.G. or received under Lease-Lend, no final settlement could be made without the matter being referred to Main Secretariat. Details of the balancing equipment, installations, etc., which were not taken over by contractors and became surplus were then to be passed on to the DGD with suggestions and recommendations as to its best method of disposal and post-war value.

Orders were also issued immediately on the declaration of V—J Day to C.P.W.D., M.E.S., or contractors as the case might be, to stop work on all buildings and projects involving new construction. If any particular work or project was in the last stage of completion and it was considered that cessation of work on it would be seriously detrimental to the interests of Government from the financial or any other point of view, special orders of Government were to be obtained after giving full justification for the continuance of the project or the work concerned.

A procedure was also evolved for the disposal of semi-fabricated components left on contractors' premises as a result of cancellation of contracts *en masse* and it was decided that first the contractor on whose premises the semi-fabricated articles were left should be asked to make an offer of purchase and if the price offered was reasonable, it should be accepted.

CHAPTER LXXVIII

DISPOSAL OF WAR SURPLUSES

Governments emerge from wars as the owner of great stock piles of almost every item known in total war. Some of these items are of a strictly military nature, others such as motor vehicles, food supplies, and clothing, have non-military as well as military uses. The major portion of these stocks is composed of goods held by the armed forces for current use and military reserves. The remainder generally consists of surpluses created by the cancellation of war contracts—the raw materials and processed goods—that are not taken over by the contractors in partial payment of their claims. The disposal policy plays an important part in stimulating or retarding the expansion of private investment and industrial activity. It is, therefore, imperative that a correct policy regarding disposals of Government surplus stores should be followed which can go a long way in stimulating industrial activity and employment in the transition period and increasing the output available for civil consumption.

In India until the cessation of hostilities, problems of disposal related mostly to salvage and scrap, obsolete stores and arisings from factories. The disposal of these items was entrusted to a Directorate General of Salvage and Disposals in November, 1943. At that time the volume of work was small and it was decided that Director General of (Supply) should also hold the post of Director General (Disposals) in addition to his own duties. As the end of the war drew nearer, the volume of surpluses rose and matters of policy increased in importance and as already mentioned, a Disposals Board was constituted in September 1944 as the authority to control all disposals operations and to deal with questions of policy arising in connection with the disposal of surpluses. The following main principles were laid down, governing the disposal of surplus stores:—

- (i) To release stocks at a rate which, while fast enough to get the goods into the hands of consumer where they are most needed, will not cause the internal markets to be so flooded that there are adverse repercussions on internal economy or production plant,
- (ii) To ensure that the goods are sold to the ultimate consumer at prices which are reasonable in comparison with current prices of similar articles, and to prevent an unnecessary number of intermediaries of profiteering by middlemen,
- (iii) As far as possible, to use the normal trade channels for distribution with a view to ensure that the usual traders or manufacturers as well as the ultimate consumers in different parts of the country get their fair share of the quantities available,
- (iv) To consider the requirements of the Government of India, the Provincial Governments and the States, for their own use before the release of any goods to the civil market.

The responsibility for the execution of the decision of the Disposals Board and for the presentation to the Board of data necessary to arrive at decisions

was vested in the Directorate General (Disposals). The principles regarding actual disposal followed by the D.G.D. are given below:

Priority.—Priority is given to India's need before exports outside the country are permitted. Within India, priority is given first to the needs of the Central Government and then to those of Provincial and State Governments for their own use, before the release of any goods to the civil market.

Pricing Policy.—It is the object of the Government of India to ensure that sales are made at fair and reasonable prices and the following instructions have been issued to Director General (Disposals).

(1) **Stores which are new or as good as new.**—(i) Sales to Department of the Central Government, Provincial Governments or Indian States Governments or Local authorities will be effected at Government's current buying rates for those or similar stores. If there are not Government current buying rates, prices should be based upon current market prices. Where there are no current market prices, sales should be effected by negotiations.

(ii) Sales to other parties will be made at current market prices which, in regard to items the prices of which are controlled will be either equal to or lower than the rates fixed under the control. Where there are no current market prices, sales should be effected by negotiation or by sealed tender or by auction, whichever is likely to yield the best prices.

(2) **Other Stores.**—Except for items the prices of which are controlled, prices should be the best obtainable by negotiation or by sealed tender or by auction whichever is likely to yield the best prices.

U.S.A. Surpluses.—A comprehensive agreement about transfer of U.S. Surpluses was arrived at on the 27th February 1946 between the Government of India and the U.S. Government. Under this Agreement, Government of India agreed to purchase all U.S. Surplus property, scrap, salvage, waste materials, etc. The U.S. Government agreed to furnish with price inventories and report condition of the property. Sale price and methods of payment were to be negotiated at Washington. A Financial Settlement was later arrived at in Washington as already mentioned in the Lease/Lend chapter. This settlement transferred to the Government of India the ownership of all U.S. owned surpluses in India and of all goods supplied on Lease/Lend to the armed forces or for civilian use in India. It is subject to the condition that if the sale proceeds of U.S. owned surpluses exceed the equivalent of 50 million dollars, 50 per cent. of the excess will be paid to the U.S. Government in rupees. Instructions have been issued that consequent on the conclusion of this Agreement, any surpluses reported to the Director General (Disposals) by the competent authority may be disposed of in accordance with the general disposals policy of the Government of India.

Volume and value of Disposals.—The total net arisings from 1st October 1944 to 31st July 1946 (book value) were of the value of Rs. 11,077 lakhs. The total net disposals (book value) from 1st October 1944 to 31st July 1946 amounted to Rs. 2,859 lakhs; the actual net sale value during this period amounted to Rs. 1,975 lakhs.

The approximate tonnage of American surpluses is over 600,000 of which nearly half represents Engineering and Quartermaster stores and one-third Ordnance stores. Indian surpluses declared up to 31st March 1946 total 200,000 tons as against a total estimate of 1,513,000 tons. The rate of declaration has, however, increased since the end of March 1946 and the principal Service Branches concerned, Master General of Ordnance and the Engineer-in-Chief, are understood to be working to complete the declarations by December 1946.

The following statement furnishes information regarding disposals of surplus stores of certain main categories of stores up to 31st July 1946:—

Main category of stores	Value in lakhs of rupees (Net disposals)
	Rs.
Clothing and Textiles	945
Leather and Leather Goods	28
Machinery and Plant	49
Metals	241
Vehicles and Spares. AFVs	142
Transportation Stores	8
Building Material, Furniture and Miscellaneous Engineering Stores.	71
Antigas Stores ARP and Firefighting Equipment	10
Medical and Veterinary Stores	51
Acids and Chemicals	22
Paints, Varnishes and Enamels	25
Petroleum Oil and Lubricants	9
Other Foodstuffs	25
Animals and Livestock	88
Containers	15
Aero Stores	173
Naval Craft and Parts	36
Other Miscellaneous Stores	8
Lands and Buildings	10

The principal July 1946 sales of American surpluses were :—

	Rs.
(1) Vehicles from Morah (Assam) Calcutta Depots and Khulna.	5,22,00,000
(2) Tyres to Siam Government	22,00,000
3) Various items from Sukkur Depot	,94,000

In addition, Rs. 10,00,000 were realised from sale of Dehydrated Potatoes by Food Department to Provincial Governments.

CHAPTER LXXIX

RELAXATION OF CONTROLS

With the end of war, important questions of re-adjustment arise. As in other countries, so in India, there was restiveness among certain sections of the public regarding controls and in fact certain Chambers of Commerce represented that controls should be relaxed or removed. Having wound up the country to a high pitch of control, it is desirable in the interest of planned transition from war to peace to study very carefully how it is going to be unwound. For instance, nobody could take off price control and risk inflation until production reached a point high enough to take care of it. Some form of rationing must be retained until our homes are replenished on a proper and orderly basis. Stability is the most essential thing in the post-war period. Some of the circumstances which necessitated the controls continue to exist after the war. The sudden termination of controls may, therefore, be unwise from the point of view of national economy. If control is abandoned abruptly, chaos will occur not merely among the consumers but more among the industrial population of a country. Controls can also be utilised to initiate a programme of planned economic development. It is, therefore, inevitable that the controls should continue for some time after the war until they could safely and properly be relaxed. As a matter of fact, the need for control is even greater in the transition period than in war. Certain controls, however, do become obsolete with the cessation of hostilities and require abolition while others have to be relaxed.

The Supply Department immediately after V—J Day took up the question of abolition/relaxation of the controls during war and reviewed all controls carefully. Controls were classified into three categories as follows:—

- (i) Controls which could be abolished almost immediately;
- (ii) Controls which could be lifted in six months' time; and
- (iii) Controls that will have to be retained for an indefinite period.

Reasons why and how the various controls were instituted have already been given in Part II. The position in regard to Controls exercised by the late Supply Department on 31st July 1946 is given below:

(a) The following Control Orders have already been removed:—

Agar Control Order, Control over glass factories; Sisal and Aloe Film Control Order; Iron & Steel (Movement by Rail) Order; Iron & Steel (Movement by Road or River) Order; Cotton Baling Hoops (Control of Movement) Order; Essential Drugs (Census) Order; Cement (Movement by Rail) Control Order; Cement (Movement by Waterways) Control Order; Sulphate of Aluminium Control Order; Sulphuric Acid Control Order; Rubber Manufactures Control Order; Control over selected tanneries Hides (Movement by Rail) Control Order; Timber Control Order; Tyre Rationing Order; Coal Tar Products Control Order; Chrome Compounds Control Order, Control over prices of Retreaded Tyres; Control over prices of "Factory Seconds" Pneumatic tyres and tubes; Factories (Control of Production) Order; and Imported Engineering Stores Control Order.

(b) The position in regard to the other controls is as follows:—

(i) *Iron and Steel (Control of Production and Distribution) Order.*—In view of the key position of the steel industry, it is considered essential to maintain the existing control for an indefinite period to facilitate the transition to normal conditions. Certain relaxations have, however, been allowed. A system of quota certificates has been introduced in order to see that Service Departments and Railway demands are met in due priority and at the same time do not encroach on steel for the public. The civil quota of iron and steel has been

fixed at 500,000 tons for 1946, but as the availability of steel from all sources is still inadequate, it is intended to make arrangements whereby steel will be obtainable on specific purchase permits issued by the Provincial Governments. A number of rerolling mills which were closed down in 1943 owing to the coal shortage have been allowed to re-open.

(ii) *Iron and Steel (Scrap Control) Order*.—Pending further examination, this Order has been classified as one that may have to be retained for an indefinite period.

(iii) *Ferro-alloys Control Order*.—The Control will continue but relaxations have been made in respect of particular alloys where the import position has improved.

(iv) *Non-ferrous Metals Control Order*.—Relaxation of this control must follow relaxations made by the CRMB, but even thereafter a measure of import control would be necessary to enable all regular importers to get a share of India's allocation. The internal distribution of imported commodities must also continue until stocks in the country are fully adequate to meet requirements and a steady flow of imports is assured. Certain relaxations as programmed by the CRMB have, however, been granted.

(v) *Colliery Control Order*.—The Control will continue for some time to come. However, for certain classes of consumers only, e.g., glass and distilleries, a measure of de-centralisation into the monthly coal allocations has been introduced in the sense that the control of Central Government over sub-allocations has been replaced by the control of Provincial Governments or the industry itself. For others, Central Government control will continue. It is not yet possible for the Central Government to surrender responsibility in respect of essential consumers such as the Railways and Bunkers and of those industries, e.g., Cotton Textiles and Iron and Steel, whose production continues to be controlled by them. The Coal Industry in India requires to be re-organised on rational lines and a measure of control will probably be necessary until Government can implement the recommendations made by the Indian Coalfields Enquiry Committee recently constituted.

(vi) *Coal Production Fund Ordinance*.—Government is committed to the payment of bonus to the collieries up to the half year ending the 31st March 1946 and some of the larger schemes for increasing the output of coal will remain in being for some time to come. So long as these special expenses continue to be incurred, the power to impose the excise and customs duties must remain.

(vii) *Control over the distribution of Cement*.—Lately, almost 85 to 90 per cent. of monthly output has been made available for civilian consumption. Sales of cement up to one ton in each case are now permitted without any special authorisation. Complete control has, however, not yet been removed.

(viii) *Bleaching Powder and Chlorine Control Order*.—Available supplies of bleaching powder are still inadequate to meet the total demand and control cannot be removed for some time more.

(ix) *Control over the distribution of Diesel Oil*.

(x) *Control over the distribution of Furnace Oil*.

(xi) *Control over the distribution of White Spirit*.

Along with the transfer of Petroleum Directorate from the DGS which was responsible for the administration of these controls in the Supply Department, to the newly created Department of Works, Mines and Power, the administration of these Control Orders has also passed to that Department.

(xii) *Control over the prices of motor car and motor cycle tyres and tubes and Giant tyres and tubes.*

(xiii) *Control over the prices of cycle tyres and tubes.*

These Orders will continue for some time to come.

(xiv) *Undertakings (Charges and Accounts) Order*.—This will have to continue until pending cases including appeals have been disposed of.

(xv) *Machine Tool Control Order*.—Control over the prices of indigenous production has been removed but control over imports must continue for some time in the interest of the Indian manufacturers. Distribution control will also continue so as to ensure that essential requirements are met.

(xvi) *Paper Control (Production) Order*.—The demand for paper is still high and as total output must inevitably fall if unrestricted production is permitted, the existing control will continue until import possibilities are more clearly known.

(xvii) *Jute Industry Essential Stores and Prices Control Order*.—The Control will continue for some months as advices from the UK suggest that manufacture and supply difficulties still exist in respect of certain items.

(c) *Import Trade Control*.—With the end of war, there was a general demand for relaxation of import trade control. The import of a large number of commodities, e.g., steel telescopic flush pipes, wood screws, dry battery wax (red and black), ready-made boiler packing, brass wood screws, portable instruments, recording instruments, house service meters (AC and DC), Industrial and street-lighting and flood-light, tumbler switches, etc., certain items of textile machinery and apparatus, various kinds of drugs and medicines, writing paper, printing paper all sorts, paper including poster and stereo and all coated paper except art paper, certain woollen fabrics, blankets and rugs, sheet and plate glass, etc., etc., has been allowed and items transferred to Open General Licence List. Other items are added to the O.G.L. List from time to time.

(d) *Export Trade Control*.—Government felt that the time had come for a comprehensive review of the Export Control policy with a view not only to rebuild the old export trade but also to capitalise the present opportunities and develop old markets and cultivate new ones. The object was not only to revive the pre-war trade in agricultural products but also to market abroad, particularly in the adjoining countries, the products manufactured in the country during recent years. As a result of this review, numerous items, e.g., natural indigo, a number of chemicals and chemical preparations, scientific instruments of indigenous origin, articles mainly or wholly made of mica, animal oils, many essential oils, cigarettes of indigenous manufacture, a number of metals and ores, raw cotton, essential oil seeds, spices of all sorts excluding pepper and cinnamon and condiments and curry powder, etc., etc., have been freed from control and it is proposed to allow exports of many others much more freely than hitherto. The control over export of more than twenty commodities such as agar-agar, bees wax, certain classes of buttons, candles, cinematograph films, cutlery, glue and raw materials, leather manufactures, etc., has been relaxed and export allowed with a view to re-establish contacts with India's natural or old markets.

CHAPTER LXXX

FUTURE OF ORDNANCE FACTORIES

Before the war there were 6 Ordnance Factories, 1 Clothing Factory and 1 Harness and Saddlery Factory. To meet the war demands the number of Ordnance Factories rose to 20, of clothing factories to 9 and Harness and Saddlery Factories to 4. The number of men employed increased greatly, and at the peak of production, was almost eight times the number employed before the war. It was apparent from the very beginning that the end of war would entail a substantial reduction in the output of munitions and little or no use would be found for ordnance equipment in several factories. It was thought that while sufficient munitions production would continue to preserve the technique of the many highly specialised processes involved in the manufacture of weapons, ammunitions and explosives, it was evident that the labour force employed on munitions in the war must fall substantially in peace. The sudden collapse of Japan threw up large surpluses of war-like stores which meant that only 'trickle' production was required until the peace-time load, related to the extent of the future war potential was established. The size of the peace-time force depended upon the scope of the 'war potential' and of forces re-equipment programme.

The utilisation of ordnance factories fell into two parts:—

- (1) during immediate post-war period 2-3 years; and (2) the end use of the factories. In the immediate post-war period, there could be two major activities—
 - (a) to break down stores and materials and processes into types of materials acceptable by the trade; and
 - (b) filling the industrial gaps caused by the ravages of war in such direction as could not conveniently be undertaken by the civil industry.

Thus the problem of factories was two-fold:—

- (1) To establish peace-time manufacture to a certain scale to ensure timely expansion to a figure calculated to meet the emergency demands of peace-time requirements.
- (2) A survey of the factories producing war stores which could be switched over to civilian production with or without modification should be undertaken. The nature and extent of the modifications involved was to be found out and the stores that could be manufactured for civilian population.

In July 1944 a Committee, known as the Loch Committee was set up, under the directions of the Reconstruction Committee of Council, to report on the future of Ordnance and other Government-owned Factories.

The Committee went into detail and recommended the retention of fifteen factories, viz., two Kirkee factories (High Explosives and Ammunition), four Cawnpore Factories (Ordnance Factory TP I, Ordnance Factory TP II, Parachute and Harness & Saddlery Factories); Cordite Factory, Aruvankadu, Gun and Carriage Factory, Jubbulpore; Scientific Instruments Factory, Dehradun; Ordnance Factories at Amernath, Katni, Khamaria and Muradanagar respectively; and two Clothing factories to be selected from among the factories at Sialkot, Shahjahanpur, Madras and Bombay. The Committee suggested the release for disposal as being surplus to requirements of remaining, i.e., 13 factories, viz., two factories at Ishapore (Metal and Steel and Rifle); Purn Gun

Factory, Hyderabad; Gun and Shell Factory, Cossipore; Ordnance Factories at Lucknow and Amritsar; Gun and Shell Factory, Dum Dum; Harness and Saddlery Factories at Cossipore, Amritsar and Madras; Clothing Factories at Agra, Delhi Secunderabad and Calcutta; Parachute Factory, Lahore; M.I.O., Calcutta (Its retention as a civil factory has been decided); and two Clothing Factories to be selected for release from among the factories at Sialkot, Shah-jehanpur, Madras and Bombay.

The proposals for retention were based on the following principles:—

- (a) the assessment of Defence Services requirements in munitions in peace and for expansion in war agreed to by the General Staff;
- (b) similar estimates of requirements in the more general nature of stores; and
- (c) technical surveys of (a) and (b) above carried out by the Supply Department.

It was admitted from the very beginning that while the then assessment of peace-time requirements might differ somewhat from the figures arrived at in later experience, these differences were not likely to affect the numbers and types of factories to be retained. In coming to their conclusion the Committee was guided by the principle that India should be self-supporting and this principle was applied on the whole range of munitions items of which manufacture was established. The Committee was also led by the geographic considerations and generally speaking, of concentrating well within the frontiers of India; desirability of abandoning old factories where the buildings were unsuited to modern industrial practice as applied to munitions and where the conditions of work and the welfare of the workers were fast sinking below modern requirements; transportation i.e., juxtaposition of raw materials etc., to the various manufacturing processes; labour, climatic considerations and minimum dislocation of the existing plants, etc., in the selection of factories for retention or otherwise.

The recommendations of the Loch Committee were generally accepted by the Disposals Board and were approved by Council subject to further examination of the possibility of release of the Muradnagar factory, and a technical examination of the position of the Clothing factories with a view to deciding which of the Clothing factories should be retained or released. Technical Committees were then set up in July 1945, to examine and advise on:—

1. the movements of plant and the new buildings required to house the plant;
2. the assessment of surplus capacity in Ordnance factories to be retained and uses to which it could best be put;
3. technical examination and more detailed assessment of the potentialities of the factories and its attendant properties to form a basis on which sales could be undertaken;
4. an appreciation, with the assistance and advice of the War Department, of the time when the various movements and releases could be undertaken;
5. proposals for ensuring the retention of adequate staffs in the factories;
6. the possibility of release of Muradnagar after moving part of its equipment to Cawnpore, and
7. future of the Clothing factories.

The technical Committee on Ordnance Factories was required, in addition:—

- (a) to report on the financial effect of the proposals regarding Ordnance Factories, and
- (b) to consider proposals for the disposal of the Amritsar factory.

Recommendations of the Technical Committee on Muradnagar and Clothing factories are below:—

- (1) Muradnagar factory should be retained as an Ordnance Factory for the present but that the position should be reviewed after two years.
- (2) The Committee on Clothing Factories consider that the existing clothing factories are not suitable for retention and have recommended establishment of two new factories.

The position of the factories, recommended by the Loch Committee to be released, after examination of the report of the technical committee is as follows:—

Metal & Steel Factory & Rifles Factory, Ishapore.—The Technical Committee recommended their disposal for development to industrial units, but it has been decided that these factories should not be disposed of for the present and that basic steel be manufactured in the Metal & Steel Factory. The position of these factories will be reviewed by the War Department in January 1947.

Gun & Shell Factories, Cossipore and Dum Dum.—It is proposed to manufacture textile machinery and road rollers and unless this proposal is dropped there is no immediate prospect of their disposal.

Ordnance Factory, Lucknow.—The Technical Committee has recommended that the best method of its disposal is a factory site and buildings for development into an industrial unit. At present the factory is put in "care and maintenance" and the question of its disposal is being taken up.

Ordnance Factory, Amritsar.—This is being transferred to the Punjab Government.

M.I.O. Calcutta.—This will remain permanently under I. & S. Department as a civil factory for the manufacture of mathematical instruments.

Branch Harness & Saddlery Factories at Cossipore, Amritsar and Madras.—These factories have since closed down.

Clothing Factories at Lahore, Agra, Delhi, Secunderabad Sialkot, Shahjahanpore, Calcutta, Madras & Bombay.—Except factories at Shahjahanpur and Madras all factories are closed.

When the factories were transferred to the Supply Department in August 1940, it was ordered that the transfer would be for the duration of war. It has now been decided that the factories remaining under the Supply Department will be transferred back to the War Department on 1st April 1947.

Civil Production in Ordnance Factories.—The end of the war found India starved, over a period of years, of much of the ordinary civil requirements of peace-time and of the equipment required for production. There was an overwhelming case for making the fullest use of production capacity, wherever it was to be found, in the rehabilitation period, but there was some hesitancy in placing and accepting work. At the peak of production the labour force reached 102,000. It stood at 92,000 at the end of August 1945, and at 57,000 at the end of November, 1945. The number of workers required for peace-time requirements was not very appreciable and to mitigate unemployment, Government authorised Ordnance Factories to accept civil orders, and they began to manufacture limited quantities of steel, railway equipment, and by a variety of tools, gauges, etc., required by Government Departments and by a few trade firms. It was however, felt that active steps should be taken to meet civil needs and employable capacity should be allowed to lie idle at Ordnance Factories. Provincial Governments and Central Government Departments should be invited to place as much of their requirements as possible on Ordnance Factories.

It was, therefore, proposed that Ordnance Factories should tender for Government work, solicit civil work and invite public enquiries from civil indents. In pursuance of this policy, the Ordnance Factories are now engaged in the manufacture for civil requirements of a certain amount of steel which would otherwise require to be imported. They are also manufacturing tools, jigs, fixtures and gauges, forgings and castings, stampings, press work, non-ferrous metals, light and medium parts for machinery, optical and precision instruments, survey instruments and woodware of various descriptions. They are also playing an important part in the establishment of production of road-rollers for which a large indent had been placed by the War Transport Department in connection with Central and Provincial Post-war road development schemes. Another important class which is receiving attention comprises Textile Machinery and parts. It is, of course, not intended that the Ordnance Factories should compete with private industry.

The number of orders in hand on 31st July 1946 was 1,120 and the value of the civil work done from September 1945 to 31st July 1946 comes to about Rs. 50 lakhs. All this is filling the gaps in indigenous production and has secured the retention of technically skilled personnel and the beneficial use of plant and machinery.

CHAPTER LXXXI

RE-ORGANISATION AND BIRTH OF A NEW DEPARTMENT OF INDUSTRIES AND SUPPLIES

On V-J Day, the Supply Department comprised—

- (a) Main Secretariat.
- (b) Directorate General of Munitions Production.
- (c) Directorate General of Supply.
- (d) Directorate General of Aircraft.
- (e) Directorate General of Shipbuilding and Repairs.
- (f) Directorate General of Disposals.
- (g) Iron & Steel Controller & Steel Commissioner.
- (h) Coal Commissioner.
- (i) Electrical Commissioner.
- (j) Controllers of Supplies at Calcutta, Bombay, Lahore, Karachi, Madras and Cawnpore.
- (k) India Supply Mission, Washington.

(a) **Re-organisation of the Department of Supply.**—With the cessation of hostilities and complete rout of Axis Powers in August 1945, it became apparent that some re-organisation of the war-time Supply Organisation and the framing of the future policy of procurement were necessary. The Government of India decided to retain after the war a single department responsible for procurement of all stores in India or abroad for the Central Government (including the Defence Services), administration of Government-owned Factories not allocated to specialised departments, planning and development of industries and undertaking of disposals. No change, however, was contemplated in regard to the items dealt with by the Food Department and the Controller of Printing and Stationery. This decision, generally speaking, is a continuance of the war-time practice and has obvious advantage both in securing that purchases are made most economically and at the same time that the fullest use is made of indigenous capacity.

As a consequence of this general decision, the functions previously exercised by the Indian Stores Department and the Contracts Directorate [General Headquarters (India)] were to be exercised by the new procurement organisation and a single cadre of procurement officers set up. As regards the procurement of supplies from abroad, the two agencies—India Supply Mission in Washington and the Director General, India Stores Department, London—would continue to perform this function as during the war, the full administrative responsibility being taken over by the new organisation. The new organisation would also take over the general responsibility for inspection of all stores with the exception of stores under the Chief Inspector of Explosives and of those Departments which might wish to retain their own inspection for specialised stores. This Inspection work would involve, in addition to the return to the new Department of pre-war Inspection responsibility of the I.S.D., the transfer of certain responsibilities which were exercised by General Headquarters (India) before the war.

In view of the above decisions, some re-organisation of the Supply Department was necessary. The necessity for continuing the war-time separate Directorates General and the Provincial Organisations was rapidly disappearing. The requirements of separate planning and provisioning in advance of actual

purchase action on the war-time lines were also rapidly diminishing. At the same time, on the one hand, reconversion of industry and questions relating to its future development required increasing attention and competent direction, and on the other, disposal of salyage and surplus stores was assuming increasing importance and required full-time attention. It was, therefore, originally intended to re-organise the Department with the object of securing a peace-time set up on the following lines:—

- (a) a separate Directorate General of Disposals situated at Delhi with Regional Offices at important centres.
- (b) a separate Directorate General of Industries and Supplies to undertake the procurement and development responsibilities comprising three Wings, Inspection, Procurement and Development, each under a Deputy Director General, and Regional Offices to replace the Controllers of Supplies Organisations.
- (c) a separate Directorate General of Ordnance Factories responsible for the administration of such Government-owned factories as continue to be the responsibility of the peace-time department;
- (d) the Secretariat.

The war-time organisations of Coal Commissioner, Iron and Steel Controller and Electrical Commissioner were, however, beyond the scope of this general policy and they were not affected by this re-organisation except that some contraction did take place owing to the general diminution in work.

The above were the broad outlines on which the future organisation of the department was to be constructed. It was, therefore, decided that the entire organisation (excluding the special organisations) would be folded up in two stages—Stage I to be completed by 31st December 1945 and Stage II to be reached by 31st March 1946 and that the Purchase Branches hitherto directly under the administrative control of the Main Secretariat would be transferred to the respective Directorates General and Controllers of Supplies. Action was also to be taken to secure that by the end of Stage I, integrated Procurement Cells were constituted and staff reduced in conformity with this interim organisation. It was also decided that the Additional Director General (Ordnance Factories) in the D.G.M.P. would cease to be responsible to the D.G.M.P. and all re-organisation reports etc., would be submitted by him to Main Secretariat through M.P. Secretariat.

The first step in accordance with these decisions was the abolition of the Directorate General of Supply, separation of Directorate General of Disposals and creation of a new Directorate General of Industries and Supplies with effect from 17th December 1945.

Below is given a brief summary of the action taken to wind up the multifarious activities of the war time offices and to reorganise the Department.

D.G.M.P.—To carry out the Stage I scheme, it was decided that the Regional Organisation to be set up in Calcutta by D.G. (I. & S.) would deal, in addition to stores dealt with by D.G.M.P. with items hitherto dealt with by the separate Purchase Organisations attached to the Calcutta Branch of the Directorate General (Aircraft), the Iron and Steel Controller and the Controller of Supplies, Bengal. The responsibility for Progress and Provision was transferred to the Procurement Branch and all indents were to be received and directly acted upon by that Branch and not to be referred to the Planning Directorates. The work done by the Planning Directorates was to be analysed into (a) procurement functions and (b) control and development functions. The Procurement functions were to be transferred to the Chief Controller of Purchase (Munitions) and the control and development work to the new Development Division of the

D.G. (I. & S.). These Cells remained under the control of the D.G.M.P. till 1st February 1946 when the D.G.M.P. was abolished and they became directly responsible to the D.G. (I. & S.). The clearing up of the C.A.P. accounts, Drum sheets and machine tools accounts and any other outstanding matters which did not form part of the new organisation were transferred to the control of the Deputy Director General (Co-ordination) who was also made responsible for Stores, Store Accounts and Transport and Priority till they were finally liquidated.

The volume of work falling on new Procurement Sections was considerably obscured by the work arising from V-J cancellations. This work was to continue as the cancellations were to arise from the review being undertaken in Ordnance Depots during the months of October, November and December and it was, therefore, anticipated that cancellations would continue up to the end of January 1946. Moreover, although the number of indents reaching DGMP was falling, the amount of work involved did not fall in the same proportion but rated more in proportion to the number of indents. Similar was the case with the Development Division. The difficulty here lay in the fact that no precise indication could be had of the work likely to fall to this Branch in future. Then there was other residuary work relating to Progress, Provision and liquidation of stocks. It was, therefore, not possible to adhere to the dates fixed for adjustments during Stage I.

The DGMP Organisation was actually folded up to Delhi by the end of April 1946. The Procurement work was integrated into two Directorates of Supplies at Delhi—Directorates of Engineering Stores and Railway Stores. As regards the Development work, it was split into five Development Cells, viz., Mechanical and Railway Engineering, General Engineering, Electrical Engineering, Tools and Metals and placed under the DDG (Development). The Branch Secretariat (M. P.) was also closed with effect from 1st June 1946. Some skeleton staff was, however, kept for the present at Calcutta to deal with any residuary work and establishment cases, viz., claims of persons discharged, maintenance of records, disposal of surplus furniture, de-requisitioning of jute mills, etc., etc.

DGS.—As in the case of DGMP, here also it was not possible to work exactly to the two dates. The Branch Secretariat (Supply) was wound up with effect from the 29th January 1946 and the work transferred to the new Administration and Co-ordination Directorate which was created to perform the executive duties hitherto performed by the Branch Secretariats at Calcutta and Delhi; the proper Secretariat work having been taken over by the Main Secretariat. The Clothing and Harness and Saddlery Factories Directorate was transferred to the new Directorate General of Ordnance Factories and the Petroleum Directorate to the new Department of Works, Mines and Power with effect from 1st April 1946. The work performed by the CCP(S) was entrusted to the newly created Procurement Directorates Textiles and Leather and Chemicals and Miscellaneous which formed a part of the new Procurement Wing. The development work handled by the DGS was shifted to the new Development Division where Timber, Chemicals, Drugs and Plastics, Textiles, Glass, Rubber, Leather and Paper Development Cells were to be created. Some war-time Sections were, however, allowed to continue till the residuary work, e. g., finalisation of Timber Stock accounts, liquidation of Timber stocks and winding of Timber Depots and Sawmills, Vehicles Directorate, Rubber Control, etc., is finally liquidated.

DGSR.—The load on this Directorate General began to diminish rapidly with the end of war and the Organisation was abolished with effect from 31st January 1946 and only a Directorate of Shipbuilding and Shiprepairs was left at Bombay to deal with the residuary work and finalisation of claims, contracts and cancellations etc. The Regional Organisations were also wound up and

any residuary work was entrusted to the Regional Offices of the D. G. (I. & S.). The procurement functions of the D. G. S. R. have been transferred to the Procurement Wing and the development of shipbuilding and repair industry was entrusted to the Development Division of the D. G. (I. & S.).

D. G. A.—The extent of the load was determined and the organisation adjusted accordingly. As there was a small load and not much of residuary work, the organisation was wound up at Lucknow and some skeleton staff for liquidating any left-overs and closure of C. M. U's, R. E. D's, etc., was brought to Delhi in February 1946 under a Deputy Director General. The various undertakings of D. G. A. consisted at the peak, of 16 C. M. U's, 6 R. E. D's, 7 C. R. O's, (M. T.) and two Stores Depots at Calcutta and Bombay. With effect from the 1st October, 1946, the Directorate General of Aircraft has been abolished and the outstanding work transferred partly to the D. G. Disposals, and partly to the D. G. Industries and Supplies. The D. G. D. is responsible for the disposal of surplus stores of the D. G. A. Store Depot at Calcutta, and Bombay, and of the C. M. U.'s which have been or are being closed down. The D. G. I. & S. is in charge of C. R. O's (M. T.), R. E. D's. Bonded Stores and a portion of No. 1 C. M. U., which are still functioning.

Iron & Steel Controller.—No changes have been introduced in this organisation except that immediately with the re-organisation plans, the procurement functions of this organisation were, in the first instance, transferred to the Procurement Wing of the D. G. M. P. which are ultimately taken over by the D. G. (I. & S.). A considerable contraction has, however, taken place. There is still a general shortage of iron, steel and allied products and the slight relaxation, though not on the war-time scale, will have to continue so long as the Control lasts and the necessity for planning, development and assistance to the Iron and Steel Industry persists.

Coal Commissioner.—The coal problem did not disappear with the end of war. In war-time, several industrial expansion schemes could not be pushed through due to the non-availability of coal. Moreover, all industries naturally like to expand and utilize the capacity lying idle in war-time. Large demands were also received from Liberated Countries of the S. E. A. for rehabilitation purposes which in pre-war days were largely dependent on India. Thus any decline in Defence Services demands of coal, direct or indirect, was counteracted by the increase due to the above reasons and no reduction whatever was noticeable in coal demands. The coal raisings and despatches, however, did not show any signs of improvement and all the war-time problems still persisted, thereby forcing Government to continue with the measures adopted during war. No re-organisation was, therefore, effected in this Organisation. Government has, however, appointed an Indian Coalfields Enquiry Committee and the future of the Coal Commissioner's Organisation, will considerably be influenced by their recommendations.

Regional Organisations.—As already stated, the object was to wind up the organisations of the Controllers of Supplies as quickly as possible, transferring any residuary work to the Regional Procurement or Disposals Organisations contemplated in the new set up. All the offices of the Controllers were, therefore, abolished in February 1946 and the functions relating to "Procurement", "Disposals" and "Planning" were separated; the first two being entrusted to the Procurement and Disposals Organisations respectively, while there was no need for Planning now by these organisations. The D.G.D. set up Regional Offices at Lahore, Calcutta, Cawnpore and Bombay under Regional Commissioners of Disposals. The D.G.(I.&S.) set up Regional Offices at Bombay and Calcutta under Directors of Supplies and at Karachi, Cawnpore, Madras and Lahore under Deputy Directors.

Electrical Commissioner.—By the end of war it had become evident that a number of the functions carried on by the Electrical Commissioner's office were essential in peace-time if India was to progress with any considerable industrial development in an orderly manner. Accordingly, the Government of India decided that the Electrical Commissioner's office would continue as a permanent institution with a number of functions which could best be undertaken by the Central Government. The Organisation was, however, transferred to the new Department of Works, Mines and Power with effect from 1st April 1946.

Inspection Wing.—The Civil Wing of the CGI (M.G.O.) was transferred *en bloc* to the Department of Industries and Supplies with effect from 1-8-1946, which constitutes the Inspection Wing of the D. G. (I. & S.) as originally envisaged.

India Supply Mission.—With the end of war, the U. S. Government favoured the use of private channels in inter-national trade as most consistent with the principles of Free Trade Policy. At the same time they recognised that the prompt conversion of the economies of the World, stabilisation of prices and equitable distribution of available supplies might make necessary the continuation of Government participation in trade during the transition from war to peace. With this in view the U.S. Government desired that the Purchasing Missions which were established in that country by other Governments during the war emergency should limit their operations during the transition period to the procurement of those commodities which were necessary to meet essential civilian requirements for relief and rehabilitation and finally, as the transition period draws to a close and the emergency ceases to exist, these war-time measures should be disestablished.

On this, the future set up of the India Supply Mission was examined and it has now been decided in consultation with Commerce, External Affairs and the Finance Departments to convert the India Supply Mission into an Industrial Section of the Agency General in Washington with the following functions:—

- (a) to procure goods on the Government of India's account.
- (b) to furnish information about the sources of supply, availability of capital goods and industrial and manufacturing activities useful for the industrial development of India, and
- (c) to assist in obtaining technical training for Indian personnel employed by Indian firms desirous of working with American firms.

It is the ultimate intention to appoint a Commercial Counsellor or Commercial Secretary in the office of the Agent General. His responsibilities will include control of the Industrial Section.

D. G., I. S. D. London.—This organisation which was under the I. & C. S. Department has now been transferred to the control of I. & S. Department.

Merger of the Supply & the Industries & Civil Supplies Departments.—With the end of war, it became apparent that the war orders would diminish considerably and there would not be much conflict with civil supplies in the market. It was, therefore, decided by Government that as the Supply Department was staffed with technical staff, the transition of industry from war to peace and future development of industries should be the exclusive responsibility of that Department. In war-time, the Industries and Civil Supplies were also dealing with the planning and development of certain industries, particularly those vital to the civil consumers, such as Cotton Textiles, etc. With this decision, it became obvious that if the two Departments were to

function simultaneously, it would only result in overlapping, friction, inefficiency and dual control. It was, therefore decided by the Government of India that with effect from the 6th January 1946 both the Departments of Supply and Industries & Civil Supplies should be merged into one Department to be known as the Department of Industries and Supplies.

Amalgamation of the Planning and Development Department with the Industries and Supplies Department.—The Planning and Development Department was abolished with effect from the 4th July 1946 and the work relating to the Planning and Development of industries generally, Planning and Dev. of Industries (Federal Aspect), C. S. I. R., B. S. I. R., I. R. U, C, and D, S, I. R., was transferred to the Industries and Supplies Department along with the Sections dealing with this work. A separate Division, under an Additional Secretary has been formed in the Secretariat to deal with this work. The office of the Industrial Adviser has become an attached office.

Present Organisation.—A chart showing the organisation as it stood on 31-7-1946 is given in appendix I. All posts have so far been sanctioned up to the 28th February 1947 only.

CHAPTER LXXXII

CONCLUSION

Although it is difficult to envisage the type and character of the next world war, it is essential to place on record our experiences in war production and supplies so that those responsible for planning of production and supplies for future wars may study them and profit by the mistakes we made, the difficulties we encountered and the steps we took to overcome them.

(a) **General.**—In the past, winning a war was largely winning on the military front—military manoeuvres and strategy were all-important. The morale of the people and the contribution of the military machine played the lesser roles. Today military strategy goes for naught, unless it is bolstered up by morale and armament. The war has made it clear that highly industrialised nations have a tremendous advantage over the less industrialised. Industrial potential is the *sine qua non* of total war. War on the economic front is perhaps more important than war on the military front.

India's resources are described as vast, her millions as teeming and her riches as beyond the dreams of avarice, but our experience is that neither singly nor in conjunction with each other do they create production. Before we can attain the delicate synthesis which is "supply", many other things have got to be brought in. Mere riches cannot create war-like stores. There is a wide gulf between the individual financier and the man who works with his hands. All this has to be overcome. The war has taught us that it was not easy to mobilise the resources of the country for war purposes. Lack of skilled labour, scarcity of machines, machine tools, etc., created serious problems.

(b) **Staff.**—One of the biggest handicaps from which the Supply Department suffered during this war was the difficulty in obtaining suitably qualified officers. Before it was able fully to mobilise industry, a staff big enough to handle the multifarious and ever-expanding needs had to be built up from a comparatively small nucleus. Experts and specialists were chosen and taken from all phases of India's commercial and industrial life—some in paid capacity and others honorary. Advisory bodies composed of accredited representatives of industry were also set up. For a future war, it may be necessary to ask the Chambers of Commerce and Industries to give some of their keymen immediately an emergency is declared. Competent experts from industry might be ear-marked and a list prepared, which might be revised from time to time. There was a lot of wrangling about terms, conditions and agreements with individuals which did not conduce to efficiency. Preliminary negotiations regarding terms and conditions could be entered into as soon as the declaration of an emergency is likely. Moreover, some arrangement should be made with other technical departments of the Government of India, e.g., Railway Board, Posts and Telegraphs, etc., to release a certain percentage of technical personnel for the Supply Organisation immediately it is needed. Our experience has been that though in the beginning we were able to get some supervisory staff, about 1942 no department would willingly release their men as they were themselves on some sort of war work.

It may also be useful to have a reserve of Officers by attaching to the Supply organisation for training selected officers from the Defence Services and the technical departments and also to keep lists of officers from industry and commerce who have actually done well in the war supply organisation. The numbers involved need not be large but it is impossible to over-estimate the value of such a hard core of executives around whom the specialised Planning and Procurement Directorates would have to be built.

The recruitment for specialised units of the Department such as D.G.A., D.G.M.P., D.G.S.R., etc., presented serious problems. In many cases the recruitment of personnel for a purely temporary service was possible only after paying a price incommensurate with the value of the services obtained. Technical Training Schemes proved inadequate and D.G.S.R. and Ordnance Factories had to resort to their own schemes for training of labour. The European (British) Subjects Act, 1940, and the National Service (Technical Personnel) Ordinance 1940 proved of inestimable value. Enactment of some such legislation and introduction of Technical Training Schemes immediately at the beginning of an emergency would be essential to secure the necessary technical personnel.

(c) **Forward Programmes.**—It takes time to raise and train an army, but it is not good policy to allow the production of supplies to lag behind recruiting and training activities. For some time after September 1939, there was a slack period and the industry was far from being fully occupied. Indeed at times factories were appealing for orders and during 1940, we were only able to keep certain works fully employed by exporting large quantities of military stores, e.g., Army blankets, boots, cotton textiles, to U.K. Later on we should have been very glad to have these materials. Until 1941 the system was to send from time to time *ad hoc* indents to the Supply Department. This produced a condition of "Stop and Go" in production. Manufacturers were unable to plan ahead for raw materials and labour. At times they had too much work and at others too little. Steady and assured production at a certain level should be the ideal. In 1941 the Supply Department pressed for a system of Forward Programmes and from that time onwards production was planned forward in early stages. The point here is that it is not necessary to delay going into steady production as soon as possible after the outbreak of war. Production should be ahead of any recruitment, and if it is delayed, unnecessary problems arise and later on cause congestion in respect of production, transport and storage. Long-range planning always with provision for quick adaptation, if necessary, in a suddenly changing situation, is sure to enable the country to meet her undertakings in supply in times of war.

(d) **Controls—Price and general.**—During the first phase the Supply Department was able to meet its liabilities by using the peace-time system of competitive tendering, but as Defence demands absorbed more and more of the industrial capacity, the element of competition among manufacturers disappeared and the system of procurement by negotiation had to be adopted. Cost accounting had to be resorted to not often with full success. The third phase namely "control" arrived after Japan's entry into the war and with the disappearance of manufacturing capacity which had been available to India from other parts of the Eastern Group. Moreover, by this time the civil markets of the country had almost become denuded of stocks. The essential requirements of the civil production had, therefore, to be taken into account and control after control imposed, machinery set up to implement them and rules and regulations framed to endeavour to prevent the escape of commodities into black markets.

Control over the cost element in prices was attended with great difficulties in India and constant appearance in Government contracts of 'escapes' against cost increase is symptomatic of this. Many difficulties prevented the widest use of fixed price contracts. There was acute shortage of qualified man-power, technical, administrative and financial, which set a severe limitation on administrative effort in all fields. Extensive and comprehensive controls of commodity prices were for this reason alone, apart from the size and population of the country, impossible. Administration lay thin, pitifully thin, on the ground.

In general, the control measures taken were found efficacious but it is our experience that in most cases they were belated. For instance, many of the

difficulties which arose during the operation of the Iron & Steel Control could have been avoided and steel would not have been utilised for two years for non-essential purposes and the buffer stocks in the country would have enabled the Controller to give assistance in the procurement of urgent supplies. This was impossible in August 1941 when the Control was introduced as the stocks were almost negligible. Similarly controls over other essential materials might well have been imposed much earlier than was done in actual practice. For instance Pipe Control was introduced in 1942 and was not effective up to 1943. The controls on the civil side were also introduced pretty late and the problems regarding food, cloth, profiteering, hoarding, etc., might have given less trouble had the Departments of Food and Industries & Civil Supplies been created earlier and controls imposed. For a future emergency it may be just as well to keep a list of essential commodities to be immediately brought under control and this list should be revised from time to time.

(e) **Purchase policy.**—An important lesson learnt is that cost *plus* contracts were not satisfactory, though in some cases such contracts were unavoidable. They should be gradually eliminated as and when experience gained during their working renders it possible to arrange contracts at a fixed price. The fixed price should be based on the ascertained economical cost of production and should be subject to review at specified intervals. It is suggested that consideration should be given to enactment of legislation at the commencement of war which would ensure that only reasonable cost, profits and dividends be permitted. Once the flood-tide of production on a multiple shift basis is achieved, profits mount very steeply to the astonishment even of the industrialists themselves. When they savour the satisfaction of this extraordinary prosperity, it is very difficult to check the inflow of wealth into their pockets. Attempts to do so create resentment and it causes less pain if money is prevented from reaching the richman's pocket than if he is made to disagree after it is there. Moreover, certain industries become very strongly entrenched because Government's need of their products is particularly urgent. In such cases Government is often obliged to negotiate on terms more favourable than those given to other industries and bitter jealousy results. What is desirable is uniform treatment throughout and for that treatment to be applied at some stage soon after the outbreak of war when the industry is likely to be more receptive.

(f) **Government stores, plants and stocks.**—Proper accounting of stores and Government material should be insisted on from the very beginning. A very strict watch must be kept on the materials issued at controlled rates to the contractors. It has been our experience that contractors somehow or other tried to get more material than what was required and sold the balance in the black market. The Estimating Sections to check up releases of materials were set up rather late and were not adequately staffed. These should be established very early in a future contingency.

Regular stock accounting of Government stores was not undertaken especially in case of timber and other stocks maintained at various places. It has resulted in great confusion afterwards. In many cases issue of materials from stocks was not promptly acknowledged by the contractors or military authorities. The issue of timber from various Timber Depots is a case in point. A system should be devised from the very beginning to get acknowledgments of all receipts of stocks issued very promptly and verification of stocks should be done at regular intervals.

In war, Government provided capital assistance to industry and created assets with several private firms and contractors. The agreements concluded at the time of assistance owing to urgency could not be meticulously drawn and in some cases too much discretion was left to private parties. For instance, in

many cases the parties concerned had option to buy the assets or not even though installed in their premises. Government is now in many cases faced with a difficult position as the firms are offering very low prices. Government is likely to suffer a financial loss. Suitable steps should be taken to provide against recurrence of such losses in a future contingency.

(g) **Civil economy.**—War demands placed many strains on the civil economy of the country. Government requirements increased enormously and Government purchases made prices shoot up. Rising prices resulted in higher cost of war supplies and the inflation spiral set in. About 1942 shipping situation grew acute, changes occurred in military strategy, Defence Services expanded and a sharp scramble for commodities set in and the morale of the civilian population was severely shaken. The result was hoarding and scarcity of all kinds of goods from small coins to food. War production was itself threatened. Steps were taken to combat the evil and a number of controls over consumer goods, food-grains, etc., were imposed and rationing introduced. Later other measures such as diversion of war orders to the U.K. were adopted to release pressure on the civil economy. It, therefore, follows that the maintenance of civil morale is as important for the prosecution of war as the provision of weapons and stores for the fighting forces. In a future war it will be desirable to attend to the needs of the civilian population right from the beginning and not to allow the civil economy to reach the breaking point.

(h) **Statistics.**—Knowledge is or should be the basis of action and of administration. India is singularly weak in this regard and our procurement during war suffered steadily and appreciably from the inadequacy of our statistics. A lot of officers' time was spent in filling the huge gaps in the informational structure, as industrial statistics were sadly lacking. The only statistics that were available to the Supply Organisation were the Sea-borne Trade Returns but experience showed that they were defective in many respects. For instance, they contained figures only in money value and gave no details. 'Electrical stores' is shown as one unit but it contains all sorts of things, e.g., switch gear, motors, generators, fitting, etc. Similarly, 'Pipes', a lump figure of weight and value is shown but while planning it was impossible to find which type and/or types were being used in India in pre-war days. Information had to be collected from industry and such information could not be relied upon to any appreciable extent. We should have the import statistics remodelled. For any future war, the first essential is the documentation of industrial information. Statistics regarding production, details of equipment, possibilities of expansion, availability of raw materials, etc., particularly in respect of major and important industries such as Munitions, Heavy Chemicals, Iron & Steel, Non-ferrous Metals, Hides and skins, Woollen, Jute, Silk, Cotton Textiles, Machine Tools, General Engineering, etc., will be indispensable.

(i) **Specifications.**—In war-time enormous demands of the Defence Services compel the adoption of standards and qualities inferior to the peace-time specifications. In many cases, in order to meet demands, qualities and standards have had to be lowered and/or sacrificed more than once for the sake of quantity and urgency. Examples are Surgical Instruments, Appliances, Hand-loom, Blankets, Cotton Textiles, etc. There was a tendency to delay the adoption of these lower standards until forced to do so by stark necessity. This tended to put a brake on production. During this war the Inspection authorities have had on innumerable occasions to accept lower specifications. The experience gained has been invaluable, but its full value would be lost unless a careful record is maintained of the details of the lower specifications and the reasons leading up to their adoption. With this information available we should in any future war be ready to switch at the right time and have confidence in knowing that what we are doing proved to be practicable in similar conditions.

(j) **Standardisation.**—Another fact that was forcibly brought to our notice during the war was that Indian products lacked standardisation. This is a highly industrialised era when standardisation must be woven into the very fabric of our every day life. Many times products were not acceptable as standards differed from factory to factory. India has to make up much lee-way before she can reach the standard of Western countries in this regard.

(k) **Scientific Research.**—Modern warfare demands the closest liaison and collaboration with scientific development. During this war India had added considerably to her scientific equipment. To mention two examples, a Board of Scientific and Industrial Research has been set up and an important programme for the establishment of laboratories has been sanctioned. Large and well-equipped Ordnance Laboratories have been established at Cawnpore. Experience in Western countries shows that there is no aspect of the war upon which scientific research has not been brought to bear fruitful results. In Navy, Army, and Air Forces, in respect of offence, defence and communications; in the workshop and in the fields; in the mill and in the hospital, fundamental changes have taken place as a result of the systematic enlistment of the nation's talent for the war effort. It is, therefore, of the utmost importance that the post-war Supply Organisation maintains close and constant touch with these scientific bodies and should be geared to them so as to ensure that any problems or developments that arise receive proper and prompt consideration.

(l) **Location of industry.**—This war has proved that the concentration of industry into one or two areas places the country at a great disadvantage. Bengal is the home of all our engineering and munitions industries and serious problems of transplantation arose when that area was threatened with aerial bombardment by the Japanese. Lack of power, skilled labour, etc., which were already too much over-strained, aggravated the situation and installation of factories in inner areas became a serious problem. Fortunately the Japanese menace ended and the transplantation plans were not wholly pushed through. Dispersal of industry over different areas is, therefore, essential and would be of great help in the event of an emergency. It would also result in economy of transport.

(m) **Improvisation and co-operation.**—Improvisation and co-operation have been acclaimed as the key notes to victory in the production battle. The secret of success was close understanding with industry. Through co-operation of Government and industry, we have seen created new industries, new materials, new engineering methods and new thoughts on factory management and production control. Government establishments have experimented, developed and perfected technique and passed them to industry for application to production. Jobbing shops have been re-organised and re-equipped to achieve production. Small factories have been expanded, and over all, a finer grade of workmanship has been demanded and achieved. Government officers deputed abroad apprised the Supply Department of overseas technique and developments. Missions abroad have acquired special knowledge and manufacturing "know-how" and individual manufacturers have developed new processes and new systems under the spur of sheer necessity. For the most part, our combined knowledge has been thrown into a common pool, and the shortcomings of the one have been balanced by the knowledge of the other. It is only through pooling the knowledge, the technical skill and the resources, that industry can be lifted to new high levels and efficiency.

The present gigantic conflict has also shown us conclusively that if we wish to survive, we must become more self-reliant, more dependent on our resources and our almost inexhaustible supply of raw materials. In any future war, India

will have to use her man power resources to the best advantage and Government must extend a warm welcoming hand to the enthusiasts of private industry and provide unlimited facilities for getting things done in the shortest possible time compatible with the maximum economical result.

(n) **State control of basic industries.**—Another important lesson taught by the war is that there is a constant need of Government intervention in the basic industries like Coal, Iron & Steel. Key industries cannot be left to the vagaries of private enterprise. Central co-ordination is most essential. A serious situation arose in regard to coal because of lack of central direction and control over production and distribution and but for the timely intervention of the Central Government, the consequences might well have been disastrous to the war effort as well as the industrial development. The same would have been the case had the Central Government not taken control of industries like Shipbuilding, Aircraft, certain Chemicals, Machine Tools, Non-ferrous Metals, Iron & Steel, etc. The Government of India last year announced their industrial policy and stated that progress and planning had made it clear that certain industries must be taken over under central control in the interest of co-ordinated development. In the list of industries to be centralised, they included such industries as Iron & Steel, Prime Movers, Shipbuilding and Shiprepairs, Aircraft, Heavy Engineering, Machine Tools, Heavy Chemicals, Sugar, Electric Power, etc. They also stated that apart from Ordnance Factories, Public Utilities and Railways, the basic industries such as Aircraft, Automobiles, Chemicals, Iron & Steel, Transport, Vehicles, Machine Tools, Electrical Machinery, Non-Ferrous Metals may be nationalised provided adequate private capital was not forthcoming and it was regarded as essential in the national interest to promote such industries. An Indian Coalfields Enquiry Committee was appointed to recommend to Government the steps to increase the production of coal and to avoid the repetition of 1943 coal crisis. The Sindhri Fertiliser Factory to be erected at a cost of Rs. 10 crores by Government is also an offshoot of this policy, viz., active intervention by State in basic national industries.

(o) **Planning for future wars.**—We have seen that the only data compiled by the pre-war War Planning Organisation, viz., the P.S.O.C.(1) was the Reports compiled by the various *ad hoc* committees of that Committee. These Reports were, however, in actual practice found to be almost valueless and it would be interesting to know where we went wrong. Although before the war some data regarding the potential capacity of existing industries was available, the Department had no accurate idea of the demands likely to be made on them or the pace of development that would be necessary to meet the requirements of the Defence Forces. Thus these represented only one side of what should have been a balance-sheet. It is of little use if one is hard up and heading for the rocks merely to take stock of one's assets and to find that he has £100 or £1,000. The picture is incomplete, unless one also establishes exactly what he owes and when his liabilities are to fall due. Then again, the placing of demands did not eventuate as the Committee had visualised. For instance, once it was proposed that the concluding act in drafting a report would be to type a telegram placing demands on the industry, so that the whole of the industrial machine should set in motion on Zero Day. In the event, developments occurred otherwise. In fact, for some time after the outbreak of war, there was a slack period and we exported large quantities of Army blankets and boots and cotton textiles to the U.K. as already mentioned.

No thought or study had been given to vital services, such as shipping, rail and road transport, or the adequacy of coal and power supplies in relation to

multiple shift working in Industry and to the establishment of new factories. We know now to our cost that the inadequacy of transport and fuel has proved to be the most serious retarding influence in production activities.

For the future following measures appear necessary as a pre-requisite to effective planning:—

- (i) The Defence authorities must provide demand programmes staged in half-yearly periods from Zero Date until the peak demand level is reached. Much of the data on which such programmes would be based should be available from the experience gained in this war. The plan should be on a Total War basis. Even if it is found too big, then at least we shall have erred on the right and not the wrong side. For many of the items of stores calculations are made on a *per capita* basis, and for others some approximation might be made by relating the man-power of the army to the quantity of stores demanded during this war.
- (ii) Having fixed these targets the expert-Sub-Committees should start by relating them to existing and potential capacity and give consideration to the numerous factors of raw material, man power, machinery and equipment, transport, fuel and power, etc., and strike their balances of surpluses or deficiencies. As here the Total War conditions are being assumed, their reports would require further examination by the Civil authorities responsible for the economic well-being of the country. Deficiencies which are considered to be beyond the reach of productive effort in this country would have to be arranged for through other sources.

Having struck the balance-sheets, the next step should be to prepare for "turning on the heat" at the outbreak of war. At this stage, the assistance of experts from the various industries should be invited, for it is they alone who can tell the full implications of what is required to carry out the military programmes. It will be desirable to set up Honorary Advisory Panels from each of the main industries and with their expert collaboration to plan each stage of the development of the supply programme in all its aspects.

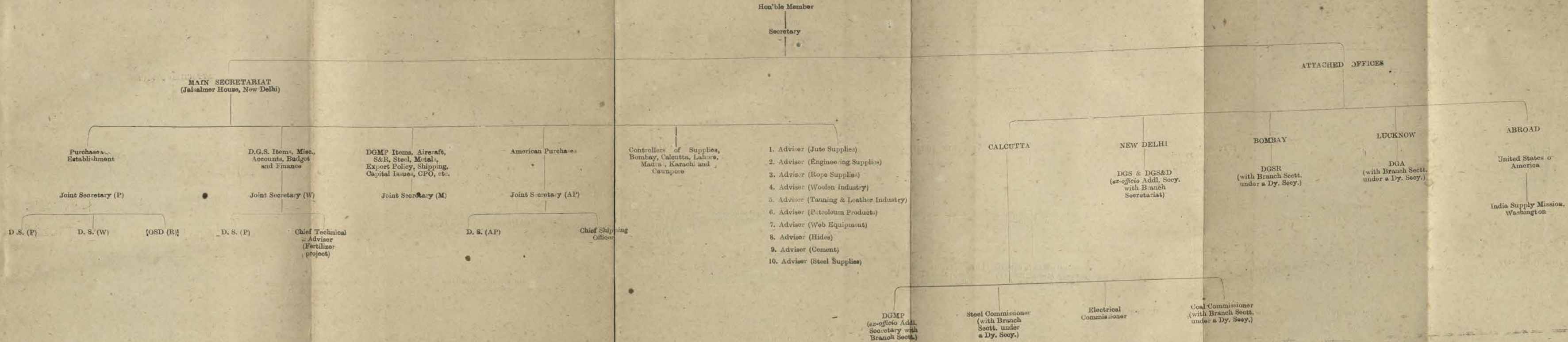
From the laying on of these production plans an attempt should be made to negotiate with the main industries the basis of contracts and the terms and conditions on which industry would operate during the war period. The size and scale of the demands as set out in the phased programmes should give a pretty clear picture to the industrialist as to the terms and conditions under which he could afford to work and make a reasonable profit and negotiations concluded in anticipation should not be impossible of achievement. Even if the actual arithmetic is not finally decided during the period of planning, a great deal would have been accomplished which, if left to be done in war time, is apt to give rise to acrimony and in any event entail a vast amount of work and argument at a time when effort can better be spent in other directions. If it should prove to be practicable to introduce at the outbreak of war legislation restricting profiteering, the drafting of war-time contract terms and conditions would be considerably simplified.

But the full benefits of the planning suggested will certainly not accrue unless a detailed and effective study is made of transport, fuel and power facilities and bottlenecks. Transport in all its aspects, namely sea (including port facilities), Railway, Air (including aerodrome accommodation) and road must be charted so as to reveal the potentialities and limitations. Similarly, fuel and power availabilities must be balanced against the demands likely to arise.

To conclude, there is not much to add to these reflections upon the mistakes made and the lessons to be learnt from this forced experiment in planned production. The mistakes have been errors of prediction, caused by changes in demand due to high policy and, therefore, not culpable; errors of judgment, that is, lack of knowledge in departments concerning essential facts; errors of personnel and of administration caused by departmental reluctance to admit that jobs might be better done by other departments, other persons, or other methods. In producing goods and services old prejudices were prominent; new ideas, speed of movement, adaptability, national outlook were sometimes lacking. To say that, however, is merely to note that "there has been a war on". It is hard to see how this sort of thing can be avoided. India did no worse in total production than others; she might perchance, with more sceptical and more ruthless scrutiny by more experts more continuously have produced more or wasted less, but "things like that we know must be with any famous victory."

APPENDICES

CHART SHOWING THE ORGANISATION OF THE DEPARTMENT OF SUPPLY AS IT STOOD ON V-J DAY

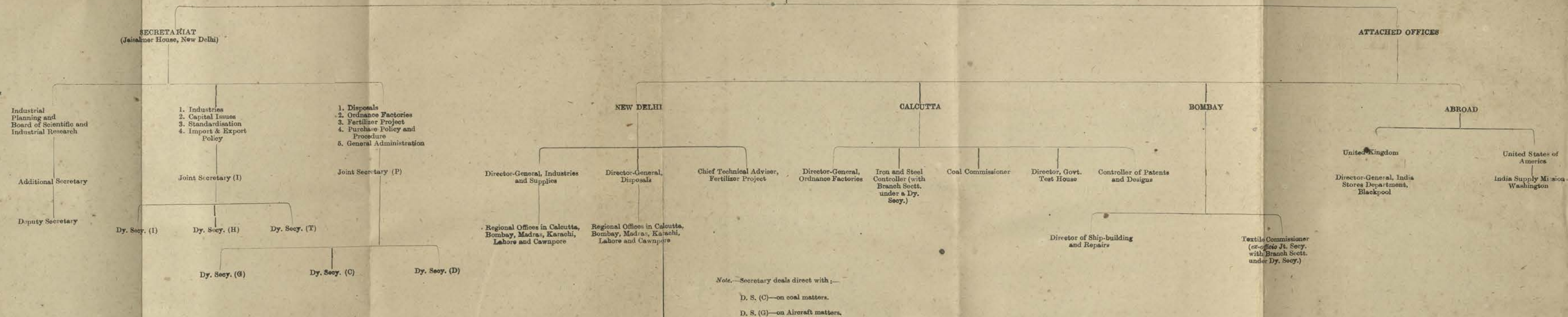


APPENDIX II

INDUSTRIES & SUPPLIES DEPARTMENT

Hon'ble Member

Secretary



APPENDIX III

MAJOR ITEMS OF SUPPLY EXPENDITURE

Food Items

Note.—1. The quantities have been expressed in thousands, except cigarettes which are in millions. The values are expressed in lakhs of rupees
 Note.—2. The figures for 1945-46 are for the period April to January, except in cases indicated otherwise.

Serial No.	Particulars of Stores	Year	Unit	Quantity	Rate	Value	Total Value	Remarks
1	2	3	4	5	6	7	8	9
					Per 100 lbs.			
1	Flour	39-40 40-41 41-42 42-43 43-44 44-45 45-46 (Apr.—Oct.)	M—Tons	7.0 77.8 34.6 49.9 60.3 38.5 29.8	4 12 5 5 5 4 7 7 2 10 2 1 16 5 6 16 6 11 14 1 3	7.53 9.30 57.70 113.88 228.90 141.71 93.97		
2	Sugar	39-40 40-41 41-42 42-43 43-44 44-45 45-46	M—Tons	3.7 8.3 29.2 68.3 105.2 106.2 52.9	12 3 0 10 15 3 12 5 3 14 0 0 17 5 9 18 4 3 20 0 3	10.65 20.35 80.78 208.09 409.30 434.68 237.21		1,401.06
							653.09	

1	2	3	4	5	6	7	8	9
3	Tea	39-40 41-42 42-43 43-44 44-45 45-46	M-Tons	0-6 1-5 4-0 5-5 9-0 10-3 8-0	per lbs. 0 4 0 0 7 3 0 14 3 1 2 3 0 10 0 0 12 1 0 14 6	3-75 14-87 80-59 141-89 125-42 173-60 161-57	701-60	
4	Cigarettes, Millions (British Troops).	40-41 41-42 42-43 43-44 44-45 45-46		Per 1,000 lbs. 875 2,031 2,435 3,913 398 1,403 10,855	8 0 0 7 1 0 6 4 6 5 9 0 7 7 0 11 2 0	54-00 143-49 152-98 217-63 29-61 158-07	753-78	
5	Cigarettes, Millions (Indian Troops).	40-41 41-42 42-43 43-44 44-45 45-46		200 832 1,652 1,635 1,942 2,476 8,637	3 10 0 3 13 0 4 15 0 4 0 8 5 5 5 4 9 2	7-00 32-00 78-63 66-11 103-67 113-25	398-66	
6	Atta	39-40 40-41 41-42 42-43 43-44 44-45 45-46 (Apl.—Oct.)	M-Tons	Per 100 lbs. 33 50 155 207 317 288 122	4 1 2 4 9 5 5 13 5 6 11 0 11 14 9 11 7 6 11 4 1	30-00 50-91 202-23 309-47 847-24 739-94 305-85	2,485-70	

7	Rice	39-40 40-41 41-42 42-43 43-44 44-45 45-46	M-Tons	7-2 21-6 46-6 119-9 153-8 209-0 138-9	4 7 0 6 7 9 8 10 9 12 11 3 13 4 0 15 2 2 16 5 4	7-11 31-44 90-56 338-70 456-69 708-76 508-30	2,141-56
8	Dhalls	39-40 40-41 41-42 42-43 43-44 44-45 45-46 (Apl. - Dec.)	M-Tons	4-9 15-5 38-5 53-4 70-2 73-4 48-3	5 4 9 5 0 5 5 13 9 9 13 0 14 4 6 12 15 3 13 7 9	5-32 17-41 50-52 117-35 224-13 213-06 145-89	774-18
9	Ghee	39-40 40-41 41-42 42-43 43-44 44-45 45-46	M-Tons	5-0 16-7 20-1 27-3 53-8 46-1 8-2	54 11 0 62 0 9 63 14 3 125 12 9 150 8 3 100 11 0 151 9 0	61-63 232-17 287-33 769-48 1,814-04 1,657-49 280-09	5,102-83
10	Oil, cooking	41-42 42-43 43-44 44-45 45-46	M-Tons	0-20 4-77 6-23 0-04 7-42	0 4 0 0 5 9 0 10 6 0 12 3 0 8 7	1-00 32-99 90-80 103-32 89-04	317-15

1	2	3	4	5	6	7	8	9
11	Biscuits, Shekpara	41-42 42-43 43-44 44-45 45-46	Per 100 lbs M-Tons	4.57 10.67 13.53 13.71 10.56	0 6 9 0 6 9 0 10 0 0 8 6 0 9 2	43.16 100.82 101.45 164.52 133.21	635.16	
12	Vegetables, Dehydrated	41-42 42-43 43-44 44-45 45-46	M-Tons	0.07 2.18 1.16 0.40 ...	Per lb. 2 5 0 2 6 3 2 5 3 2 1 6 ...	4.00 110.50 60.63 24.86 ...	205.99	
13	Potatoes, Dehydrated	40-41 41-42 42-43 43-44 44-45 45-46		3.81 0.12 4.60 6.47 3.22 3.20 1.15 18.76	0 11 0 1 3 3 1 10 9 1 6 3 1 11 3 1 13 6	1.78 123.67 243.13 100.26 121.26 47.72	638.82	
14	Condiments	41-42 42-43 43-44 44-45 45-46	M-Tons	0.30 3.67 8.17 10.18 1.56	1 6 0 1 7 0 1 2 2 1 0 3 0 11 3	9.50 119.16 206.08 230.86 24.62	591.12	

15	Onions, Dehydrated	42-43 43-44 44-45 45-46	M-Tons	0.90 0.39 1.04 1.50 4.73	1 12 3 2 2 8 1 10 3 1 6 0	35.62 18.71 71.19 47.34	172.86
16	Ghee, Vegetable	43-44 44-45 45-46	M-Tons	13.93 21.16 17.13	Per 100 lbs. 68 12 0 67 10 9 53 9 2	215.40 321.00 205.55	741.05
17	Meat, Dehydrated	42-43 43-44 44-45 45-46	M-Tons	0.40 1.44 0.94 1.14	Per lb. 5 12 0 5 5 3 8 4 9 9 1 3	50.23 174.25 174.54 232.20	631.28
18	Fruits, Dried	40-41 41-42 42-43 43-44 44-45 45-46	M-Tons	0.26 0.90 5.63 1.79 1.52 ..	0 5 9 1 3 0 0 11 7 0 12 1 1 7 9 ..	2.36 15.91 91.07 30.27 33.86 ..	173.47
19	Ground, Nut.	42-43 43-44 44-45 45-46	M-Tons	6.87 2.73 14.77 2.03	Per 100 lbs. 23 10 3 17 5 0 14 3 7 12 2 8	39.70 10.60 47.07 5.52	102.88
20	Coffee, Ground	43-44 44-45 45-46	M-Tons	0.63 0.44 0.82	Per lb. 1 11 9 1 12 3 1 8 6	24.50 17.16 28.02	69.08

1	2	3	4	5	6	7	8	9
21	Coffee, Barrios	43-44 44-45 45-46	M-Tons	0.20 1.00 1.02	Per lb. 1 1 10 0 15 10 1 0 9	0.38 22.04 44.76	67.18	
22	Tobacco, B.T.	40-41 41-42 42-43 43-44 44-45 45-46	M-Tons	0.15 0.23 0.26 0.01 0.11 0.11	6 11 3 5 8 3 9 5 9 6 0 9 7 13 0 7 7 0	22.85 27.94 33.94 12.60 19.25 17.65	134.23	
23	Oil Cake	39-40 40-41 41-42 42-43 43-44 44-45 45-46	M-Tons	2.74 4.79 7.51 25.09 18.27 19.23 20.88	Per 100 lbs. 3 2 2 1 12 3 1 9 10 3 14 6 6 7 6 6 8 0 5 12 4	1.31 1.90 2.71 23.00 20.46 23.71 27.00	105.09	
24	Margarine	42-43 43-44 44-45 45-46	M-Tons	2.20 2.95 2.45 0.23	Per lb. 0 7 6 0 7 6 0 7 6 0 10 8	22.00 29.46 24.50 3.26	79.22	

25	Golden Syrup	40-41 41-42 42-43 43-44 44-45 45-46	M-Tons	0.14 0.67 0.42 1.06 0.38 0.22	Per lb. 0 2 3 0 4 3 0 6 0 0 8 6 0 1 6 0 6 7	0.53 4.15 3.51 12.68 3.06 2.03	25.36
26	Butter	39-40 40-41 41-42 42-43 43-44 44-45 45-46	M-Lbs	201 120 250 721 246	Per lb. 1 2 0 1 3 3 1 4 0 1 13 9 1 7 0	0.23 0.14 0.31 13.64 3.52	17.84
27	Salt Refined	39-40 40-41 41-42 42-43 43-44 44-45 45-46	M-Tons	0.19 0.30 1.53 4.34 2.48 3.31 2.40	Per 100 lbs 5 4 9 4 14 3 4 4 6 5 11 3 7 11 9 7 11 9 7 4 9	0.23 0.33 1.47 5.54 4.30 5.74 3.90	21.51
28	Gur	43-44 44-45 45-46	M-Tons	4.12 8.49 5.16	Per 100 lbs 13 12 9 12 8 0 18 2 6	12.73 23.76 20.97	57.46
29	Bran	39-40 40-41 41-42 42-43 43-44 44-45 45-46 (Apl.—Oct.)	M-Tons	24.48 19.55 26.64 25.26 35.96 33.21 18.91	Per 100 lbs 2 4 11 2 3 1 3 0 3 2 4 8 6 10 3 6 14 1 6 11 4	12.65 9.60 17.99 12.96 53.50 61.18 28.42	186.30

1	2	3	4	5	6	7	8	9
30	Gram	39-40 40-41 41-42 42-43 43-44 44-45 45-46 (Apl.— Dec.)	M—Tons	9-72 16-95 16-38 43-42 47-43 61-90 31-85	4 8 9 3 15 3 4 6 8 8 7 8 10 14 6 8 14 9 9 5 3	9-93 14-88 16-21 82-64 115-70 120-35 66-49	425-20	
31	Barley	39-40 40-41 41-42 42-43 43-44 44-45 45-46 (Apl.— Dec.)	M—Tons	34-89 29-66 21-61 41-22 61-26 21-60 40-76	3 0 6 2 13 0 3 5 3 6 14 9 8 5 6 7 0 6 7 10 0	23-39 18-73 15-15 56-92 122-60 34-04 69-64	340-47	

FACTORY ITEMS. A—MUNITIONS.

NOTE.—The values are expressed in lakhs.

32	3-7" Howr. H. E. Ammunition (Filled with Amatol).	39-40 40-41 41-42 42-43 43-44 44-45 45-46	Each. " " " " "	44,000 125,000 334,000 326,000 508,000 674,000 ..	19-07 19-63 18-46 20-46 20-78 29-11 ..	8-40 24-54 61-64 66-71 105-54 196-21 ..	463-04	Shell Q. F. H. E. 3-7" Howr. Mk. V fuze No. 106-E.
33	4-5" Howr. H. E. Ammunition	39-40	Each.	2,011,000 32,476	29-34	9-53		Shell Q. F. H. E. 4-5" Howr. Mk. XII fuze No. 106-E.

33	4-6" Howr. H. E. Ammunition	40-41 41-42 42-43 43-44 44-45	" " " " "	149,000 281,000 129,732 22,800 .. 615,008	24-62 25-85 26-20 25-76 Not manufactured.	36-63 72-63 33-99 5-87	158-70	" " " "
34	6" Howr. H. E. Ammunition	39-40 40-41 41-42 42-43 43-44 44-45	Each. " " " " "	 23,000 40,500 63,500	Not manufactured. Not manufactured. 58-86 62-70 Not manufactured. Not manufactured.	13-54 25-39	38-93	Shell B. L. H. E. S. L. 6" Howr. 86 lb. Mk. I Dor. I D filled ama- tol 50/50 with or with- out smoke composi- tion in box.
35	6" Howr. H. E.	39-40 40-41 41-42 42-43 43-44 44-45	Each. " " " " "	25,000 51,000 33,000 .. 2,500 .. 111,500	77-80 68-80 68-06 Not manufactured. 63-60 Not manufactured.	19-45 35-09 22-46 1-59	78-59	Shell B. L. H. E. S. L. 6" Howr. 86 lb. Mk. 1-Door. II-D.
36	3" A. A. H. E. Ammunition	39-40 40-41 41-42 42-43 43-44 44-45	Each. " " " " "	1,848 12,000 19,740 .. 2,700 .. 36,288	32-58 30-95 31-63 Not manufactured. 28-88 Not manufactured.	0-60 3-71 6-24 0-78	10-73	Cartg. Q. F. 3" Cwt Cordite M. O. or W. H. E. shell etc.

1	2	3	4	5	6	7	8	9
37	3.7" A. A. H. E. Ammunition .	39-40 40-41 41-42 42-43 43-44 44-45	Each. " " " " "	 12,953 41,996 13,500 68,449	Not manufactured. Not manufactured. Not manufactured. 27.76 40.98 42.61	3.59 17.21 5.75	26.55	Cartg. Q. F. 3.7" Gun Cordite W. or W. M. H. E. Shell Mk. ICW Foil. " " 18 pdr. cordite M. O. H. E. shell Mk. XXXVIII fuzed No. 106 E. " " "
38	18 Pounder H. E. Ammunition	39-40 40-41 41-42 42-43 43-44 44-45	Each. " " " " "	24,000 98,000 158,000 38,000 318,000	25.08 21.33 23.48 24.98 Not manufactured. Not manufactured.	6.02 20.90 37.10 9.49	67.49	Shell Q. F. H. E. S. L. 25 pdr. Mk. T. D filled amatol 50/50 with or without smote composition in box. " " "
39	25 Pounder H. E. Shell .	39-40 40-41 41-42 42-43 43-44 44-45	Each. " " " " "	 142,000 518,000 641,400 227,636 1,529,036	Not manufactured. Not manufactured. 20.12 18.65 22.38 23.35	28.57 96.63 143.55 64.53	333.28	Cartg. F. 25 pdr. filled 1 lb. 11 oz. 10 dr. cor- dite W. 057 and 016 etc. " "
40	25 Pounder Cartridge .	39-40 40-41 41-42 42-43 43-44 44-45	Each. " " " " "	 104,740 471,000 415,000 452,032 1,442,772	Not manufactured. Not manufactured. 7.98 7.59 8.75 8.46	8.36 35.74 36.33 38.26	118.69	

41	60 Pounder H. E. Ammunition	39-40 40-41 41-42 42-43 43-44 44-45	Each. " " " " "	1,000 14,000 9,799 24,799	45.21 Not manufactured. 39.74 40.34 Not manufactured. Not manufactured.	0.45 5.56 3.95 . .	Shell B. L. H. E. 60 pdr. 57 lbs. Mk. I-D.
42	3' Mortar Bomb H. E.	39-40 40-41 41-42 42-43 43-44 44-45	Each. " " " " "	.. 11,022 142,104 213,998 367,124	Not manufactured. Not manufactured. 14.76 14.40 Not manufactured. 20.68	1.63 20.46 44.26 .	Bomb M. L. H. E. 3' Mortar 10 lbs. Mk. II or III.
43	Grenade No. 36-M	39-40 40-41 41-42 42-43 43-44 44-45	Each. " " " " "	10,080 116,928 247,968 421,128 681,408 1,477,512	Not manufactured. 3.88 3.02 3.45 5.09 4.83	.39 3.53 8.55 21.48 32.92	Grenade Hand or .303" Rifle No. 36 M. Mk. I etc. " " " "
44	Mines A/T Mk. V and/or V.H. C.	37-40 40-41 41-42 42-43 43-44 44-45	Each. " " " " "	.. 58,000 330,000 201,120 .. 589,120	Not manufactured. Not manufactured. 9.37 4.72 6.04 Not manufactured.	5.44 15.57 12.15 .	Rates for Mk. IV. Rates for Mk. V.

1	2	3	4	5	6	7	8	9
45	No. 106 E Fuze (Filled)	39-40 40-41 41-42 42-43 43-44 44-45	Each. " " " " "	.. 403,994 966,774 978,732 215,000 680,850 3,250,350	Not available. 4-06 4-18 3-88 5-38 7-28	16-64 40-49 38-04 11-57 49-50	156-30	
46	Cartridge S. A. Ball .303" Mk. VII.	39-40 40-41 41-42 42-43 43-44 44-45	1000 " " " " "	97,145,600 154,295,000 181,808,000 199,227,070 156,698,040 76,723,500 868,897,210	51-83 51-88 48-53 53-72 56-78 75-57	50-37 80-05 89-69 107-03 88-98 57-99	474-11	
47	Rifle No. I New	39-40 40-41 41-42 42-43 43-44 44-45	Each. " " " " "	.. 29,177 80,000 108,335 112,160 132,220 461,892	Not manufactured. 59-17 49-44 57-49 74-69 73-31	17-26 39-55 62-28 83-77 96-93		Rate for Rifle No. I Mk. III (without cut off). " " " "
48	Rifle No. I Repair	39-40 40-41 41-42 42-43 43-44 44-45	Each. " " " " "	.. 10,242 29,000 23,600 20,620 28,580 112,102	Not manufactured. 30-56 26-56 34-87 60-96 51-97	3-13 7-70 8-25 13-81 14-85	299-79 47-74	Rate for Rifle No. I Mk. III Repair (with- out cut off).

49	Bayonets I	39-40 40-41 41-42 42-43 43-44 44-45	Each	236 15,379 7,026 2,901 3,645 2,209 32,386	10-20 9-45 2-21 5-54 2-32 2-74	.02 1-45 .17 .16 .08 .06	1-84	Rate for Bayonet No. I. Mk. I.
50	Bayonets II (New)	39-40 40-41 41-42 42-43 43-44 44-45	Each. " " " " "	Not manufactured. Not manufactured. 75,214 151,505 163,778 211,477 601,974	Not manufactured. Not manufactured. 6-58 6-54 6-67 6-45	4-94 9-91 10-94 13-64	39-43	Rate for Bayonet No. I, Mk. II. " " "
51	V. B. Gun New	39-40 40-41 41-42 42-43 43-44 44-45	Each. " " " " "	383 834 1,541 2,413 3,219 8,300	853-28 638-86 527-50 592-74 599-83 Not manufactured.	3-27 5-33 8-13 14-30 19-31	50-34	Rate for Gun V. B. 303", Mk. III. " " "
52	Ben Tripods	39-40 40-41 41-42 42-43 43-44 44-45	Each. " " " " "	Not manufactured. Not manufactured. 230 2,590 1,900 4,720	Not manufactured. Not manufactured. 184-24 156-43 247-29 Not manufactured.	0-42 4-05 4-70	50-75	
53	3-7 Howr. Ordnance	39-40 40-41 41-42 42-43 43-44 44-45	Each. " " " " "	13 48 70 107 189 322 719	9640-92 8173-78 5505-22 8159-19 8341-41 7546-01	1-25 3-92 3-85 8-73 13-26 24-30	55-31	

1	2	3	4	5	6	7	8	9
54	3.7" Howr. Carriage	39-40 40-41 41-42 42-43 43-44 44-45	Each " " " " "	7 53 79 111 35 309 594	Per 100 lbs. 15161.45 11682.47 8009.61 11245.46 10772.86 8300.08	1.06 6.19 6.33 12.48 3.77 25.05		Rate for Mk. II Spl. New.
55	Respirator Antigas complete	39-40 40-41 41-42 42-43 43-44 44-45	1000 " " " " "	3,673 141,087 238,727 315,864 321,662 1,021,013	14467.00 15574.46 12491.59 14774.50 13585.67 Not Manufactured.	.53 21.96 29.73 46.54 43.61	142.37	
56	Cartridge Q.F.H.E. 3.7"	39-40 40-41 41-42 42-43 43-44 44-45	Each " " " " "	63,400 128,047 334,336 336,000 505,700 769,356 2,136,339	5.69 6.43 4.97 5.21 5.59 6.43	3.61 8.23 6.62 7.52 8.25 9.48	43.71	Cartridge Q. F. 3.7" Howr. filled Cordite M. D.
57	Cups Brass for .303" Cartg. cases.	43-44 44-45	Cwt. "	63,443.07 60,796.03	63.44 72.60	40.25192 44.13552		
58	Cups Cupro-nickel for .303" Cartg. cases.	43-44 44-45	" "	14,715.40 8,392.13	123.67 135.27	18.19792 11.35192		

59	Cartg. Q.F. 3.7" Howr. cases	43-44 44-45	100	447,178 663,264	308.49 326.58	13.79496 21.66083
60	Cartg. Q.F. 25 Pdr. cases.	43-44 44-45	"	595,820 596,738	248.59 286.24	14.81184 17.08159
61	Shell Q. F. H. E. S. L. 25-Pdr.— Body.	43-44 44-45	"	418,617 574,594	757.34 789.67	31.70375 45.37393
62	Shell Q. F. H. E. 3.7" Howr. Body.	43-44 44-45	Each "	993,211 134,293 454,773	7.18 7.58	9.64220 34.47980
63	Shell Q. F. Smoke 3.7" Howr. empty body.	43-44 44-45	100 "	589,066 18,521 179,739	607.27 623.59	1.1247432 11.20832
64	Shell Q. F. H. E. S. L. 25 Pdr. Mk. ID filled T. N. T.	43-44 44-45	Each "	198,260 215,000 561,855	16.66 22.76	0.358099283 1.278881576
65	Cartg. Q. F. 25 Pdr. filled lb. 1 oz. 11 drs. 4 Cordite W. 057 or W. M. 061 or W. 016 or W. M. 017, Mk. VI foil L.	44-45	"	776,855 256,998	9.66	24.8335245
66	Mines contact A. T. H. C., Mk. V/L.	44-45	"	222,000	13.02	28.9118715
67	Mines contact conversion from A. T. H. C., Mk. V/L.	44-45	1000	268,500	4697.18	12.6119250
68	Box Projectile 25 Pdr. P-62, Mk. II/L.	44-45	Each	111,900	17.38	19.4504822
69	Binocular Prismatic No. 2, Mk. II.	43-44 44-45 45-46	Each " "	5,083 5,714	252.00 219.24	12.80916 12.52718
70	Shell Q. F. H. E. S. L. 25 Pdr., Mk. I. D. Bodies.	43-44 44-45 45-46	100 " "	226,800 200,800 427,600	1688.18 1932.64	38.28785 38.80746
						77.09531

1	2	3	4	5	6	7	8	9
					Per 100 lbs.			
71	Brass Cups	44-45 45-46	Cwt.	18,300-19	89-90	16-45123		
72	Cupro-nickel Cups	44-45 45-46	"	5,866-9	190-43	11-17092		
73	Brass Ingot	44-45 45-46	"	64998-17	61-36	39-88198		
74	25 Pdr. Shell Body Forgings	44-45 45-46	Each	104,560	11-46	11-98974		
75	T. N. T.	42-43 43-44 44-45 45-46	Tons " " "	568 878 991	3631-67 3816-04 3687-66	20-55525 33-50485 36-54470		
76	Weak Nitric Acid	43-44 44-45 45-46	Cwt. " "	24,461 36,954	55-85 50-30	13-06089 18-58825		
77	Ammonia	43-44 44-45 45-46	" " "	8,192 12,995	131-20 130-03	10-74760 16-89701		
78	C. E. (Corned)	43-44 45-46	Lb.	100,476	10-86	10-90679		
79	C. E. Granulated	44-45	"	252,700	5-81	14-69132		
80	Cooker Oil Blow Lamp	42-43	Each	19,900	83-85	16-68676		
81	Cooker Oil case carrying	42-43 43-44 45-46	" " "	19,950 22,752 42,702	73-95 70-50	14-75357 16-04064	30-79421	

82	Shell Q. F. H. E. 18 Pdr., Mk. VI empty.	40-41 45-46	"	164,650	10-43	17-1748700
83	Shell Q. F. H. E. 3-7" Gun, Mk. C empty.	43-44	100	79,600	2882-63	22-9457312
84	Charges Demolition No. 16", Mk. V.	44-45 45-46	Each	40,000	37-84	15-1344275
85	Cartg. S. A. A. P. 303" W., Mk. I with gilding metal envelopes.	43-44	1000	111,98,000	127-84	14-2592589
86	Cartg. S. A. Blank 303" L/ Mk. V.	43-44 44-45 45-46	"	341,36,400 489,77,200	31-31 39-64	10-6886448 19-4179743
87	Cartg. S. A. Tracer 303"/G., Mk. II.	42-43 43-44 44-45 45-46	"	110,11,200 243,08,000 162,34,100	125-69 140-71 194-88	13-8403200 34-2044822 31-6367978
88	Cartg. Q. F. 18 Pdr. Cordite M. D. H. E. Shell, Mk. XXXVIII.	40-41 41-42	Each	98,000 158,000	21-33 23-48	20-8990600 37-0973600
89	Fuze Mine Contact AT No. 3, Mk. I.	42-43 43-44	"	522,000 574,727	2-35 3-54	12-2487000 20-3480570
90	Mines contact AT Mk. V filled T. N. T.	42-43 43-44	"	330,000 201,120	4-72 6-04	15-5740400 12-1487915
91	Mines contact A. P. No. 3, Mk. I	44-45 45-46	"	70,000	14-89	10-4226869
92	Shell B.L.H.E. S.L. 6" Howr. lb. 86 Mk. I-D or II-D.	39-40	Each	25,000	77-80	19-4493800
		40-41	"	51,000	68-80	35-0885700
		41-42	"	23,000	68-06	22-4582700
		45-46	"	99,000		76-9962200
92	Shell B.L.H.E. S.L. 6" Howr. lb. 86 Mk. I-D or II-D filled amatol 50/50 with or without smoke composition in box.	41-42	"	23,000	58-86	13-5395800
		42-43	"	40,500	62-70	25-3933000
				63,500		38-9325800

1	2	3	4	5	6	7	8	9
93	Acid Nitric	44-45 45-46	Cwt.	24,958.04	38.62	9.6402780		
94	Gun Cotton Wet pulp	44-45 45-46	Lb.	1,762,138.59	1.43	24.9841479		
95	Cordite Paste M.D.	44-45 45-46	"	878,359.52	1.66	14.5384455		
96	Cordite Paste W.M.	44-45 45-46	"	1,153,302.14	1.30	15.0073582		
97	Cordite M.D.T. 5/2	44-45 45-46	"	756,091.00	2.37	17.9247552		
98	Cartg. Q.F. 25 Pdr. lb. 1 oz. 11 dra. 4 W.M. 061 & W.M. 017 Mk. V with imported Cordite.	44-45 45-46	No.	255,690	5.34	13.6438113		
99	Cartg. Q.F. 3.7" Howr. Charges oz. 9 cordite W.M. 017 Mk. I with imported cordite.	44-45 45-46	No.	573,800	2.43	13.9247747		
100	Primer Perch Q.F. Cartg. No. 11 Mk. III.	44-45 45-46	100	1,181,700	101.32	11.9733400		
101	Fuze Perch D.A. No. 106 E. Mk. X P.B. Special.	44-45 45-46	100	262,961	810.08	21.3018750		
102	Shell Q.F.H.E. 3.7" Howr. Mk. V empty.	44-45 45-46	Each	512,200	13.89	71.1444977		
103	Shell Q.F. smoke 3.7" Howr. Mk. III L	44-45 45-46	100	115,200	1701.70	19.4830889		
104	Fuze Perch D.A. 152 Mk. I-D empty.	44-45 45-46	100	248,571	776.95	19.3128206		

105	Shell Q.F.H. E.S.L. 25/Pdr. Mk. I. Empty.	44-45 45-46	100	476,800	1401.44	66.8205314		
106	Mine A.P. No. 3 Mk. I/L	44-45 45-46	100	79,160	1356.44	10.7980421		
107	Brass Ingots for .303' cups	43-44 44-45 45-46	Cwt.	97,170.88 124,083.09	49.69 51.31	48.2836022 63.6711046		
108	Brass Ingots for Cartg. cases	43-44 44-45 45-46	Cwt. " "	30,593.63 63,407.84	50.18 50.66	15.3520289 12.1200081		
109	Cupro-nickel Ingots for .303" Cups.	43-44 44-45 45-46	Cwt. " "	29,017.46 26,790.13	71.97 75.58	20.8830633 20.2471726		
110	Shell Q.F.H. E. 18 pdr. Mk. VII empty.	40-41	Each	164,650	10.43	17.17487		
111	Shell Q.F.H.E. 3.7 Gun Mk.I/C empty.	43-44	100	79,600	2882.63	22.94573		

FACTORY ITEMS B—Clothing

NOTE:—The values are expressed in lakhs.
N.M. indicates not manufactured.

1	2	3	4	5	6	7	8	9
112	Great coats dismounted 39 type	39-40 40-41 42-43 43-44 44-45 45-46	Each " " " " "	N.M. 292,300 556,154 342,659 309,679 N.M.	per 100 lbs. 23.04 26.42 24.44 23.30 ..	67.34 148.94 83.76 72.17 ..		

	2	3	4	5	6	7	8	9
113	Great coats dismounted 40 type	39—40 40—41 41—42 42—43 43—44 44—45 45—46	Each " " " " " "	N.M. 52,268 21,548 153,490 118,177 4	11-44 11-82 15-86 19-38 19-89	5-98 2-55 24-35 22-80 0-00079	..	
114	Nets Mosquito Universal	39—40 40—41 41—42 42—43 43—44 44—45 45—46	Each " " " " " "	N.M. " " 1,631,753 1,929,930 1,179,151	 5-67 7-32 9-07	 86-93 140-29 106-94	..	
115	Bags Kit Universal	39—40 40—41 41—42 42—43 43—44 44—45 45—46	Each " " " " " "	229,698 1,343,262 3,515,607 1,906,513 1,020,864	2-46 2-06 2-14 3-10 3-22	5-86 27-87 75-36 59-18 32-90	..	
116	Short Drill Khaki Universal with turns up.	39—40 40—41 41—42 42—43 43—44 44—45 45—46	Pair " " " " " "	2,969,957 4,601,755 N.M. " " "	2-62 2-4	77-91 111-73	..	
117	Shorts Drill Khaki 1941	39—40 40—41 41—42 42—43 43—44 44—45 45—46	Pair " " " " " "	.. 6,330,829 13,918,144 7,150,213 2,592,170	.. 1-91 2-11 2-63 2-86	.. 121-01 293-98 188-44 74-18	..	

118	Shorts Drill Khaki Australian Pattern.	39-40 40-41 41-42 42-43 43-44 44-45 45-46	Pair " " " " "	.. 1,133,505 83,514	.. 2-10 3-10	.. 23-78 2-59 .. .. ..	.. .. .. .. .. ..
119	Capes Porous Antigas No. 1	39-40 40-41 41-42 42-43 43-44 44-45 45-46	Each " " " " "	 780,189 212,014 452,051 ..	 6-02 8-27 10-30 ..	 46-94 17-54 46-55 ..	.. .. .. .. .. ..
120	Capes Antigas No. 2	39-40 40-41 41-42 42-43 43-44 44-45 45-46	Each " " " " "	 639,732 11,075	 5-22 5-07	 33-44 0-56 .. ..	.. .. .. .. .. ..
121	Capes Porous Antigas sleeves detachable	39-30 40-41 41-42 42-43 43-44 44-45 45-46	Each " " " " "	 173,620 49,892 20 ..	 1-26 1-20 2-10 ..	 2-18 0-60 0-00041 ..	.. .. .. .. .. ..
122	Capes Porous Antigas (No. 3)	39-40 40-41 41-42 42-43 43-44 44-45 45-46	Each " " " " "	 907,731 758 16 ..	 5-21 4-73 7-25 ..	 47-36 0-040 0-00116 ..	.. .. .. .. .. ..
123	Capes Porous Antigas Tippet detachable.	39-40 40-41 41-42 42-43 43-44 44-45 45-46	Each " " " " "	 194,958 48,580	 0-73 1-10	 1-42 0-50 .. ..	.. .. .. .. .. ..

1	2	3	4	5	6	7	8	9
124	Battle Dress Serge Blouses	39-40 40-41 41-42 42-43 43-44 44-45 45-46	Each " " " " " "	... 272,944 320,015 452,079 486,271 432,800 ...	9-23 9-91 8-79 8-79 9-33 ...	... 25-21 31-72 39-77 42-76 40-36 ...	...	
125	Battle Dress Serge Trousers	39-40 40-41 41-42 42-43 43-44 44-45 45-46	Pair " " " " " "	... 332,806 1,034,204 619,938 858,166 630,301 ...	7-13 11-02 10-38 10-09 10-54 ...	... 23-72 113-95 64-38 86-59 60-46 ...	...	
126	Battle Dress Blouses Drill	39-40 40-41 41-42 42-43 43-44 44-45 45-46	" " " " " " "	 419,465 1,460,770 2,303,199	 3-05 2-97 3-57	 12-82 43-35 82-18	...	
127	Battle Dress Blouses Cellular	39-40 40-41 41-42 42-43 43-44 44-45 45-46	Each " " " " " "	 3,500,667 2,966,113	 3-08 3-36	 107-82 99-73	...	
128	Battle Dress Trousers (Drill all types).	39-40 40-41 41-42 42-43 43-44 44-45 45-46	Pair " " " " " "	 669,095 3,705,012 2,394,843 ...	 3-14 4-55 4-56 ...	 21-15 16-87 109-15 ...	...	

129	Shirts Flannel Silver Grey	39-40 40-41 41-42 42-43 43-44 44-45 45-46	Each " " " " " "	171,394 139,950 705,058 859,571 1,052,897 10,819 ...	4-75 6-69 6-16 7-13 6-67 7-12 ...	8-15 9-37 43-46 61-31 70-22 0-77 ...	...
130	Shirts Angola Drab.	39-40 40-41 41-42 42-43 43-44 44-45 45-46	Each " " " " " "	40,730 88,856 1,364,833 1,034,652 1,125,009 677,802 ...	5-11 5-55 5-35 6-16 6-90 7-79 ...	2-08 4-93 73-03 63-73 77-64 52-82 ...	...
131	Shirts Cotton Bush Cellular	41-42 42-43 43-44 44-45 45-46	Each " " " "	2,755,179 11,805,685 2,623,431 760,185 17,944,480	2-26 2-47 2-98 3-55 ...	62-38 291-63 78-27 26-99 ...	 459-27 ...
132	Shirts Cotton Cellular Khaki	39-40 40-41 41-42 42-43 43-44 44-45 45-46	Each " " " " " "	162,591 3,362,148 8,250,157 1,010 825 ... 11,776,731	2-50 1-97 1-71 ... 2-17 1-49 ...	4-07 66-39 141-13 ... -002 -0123 ... 211-604	... ... ... ... ... ... ...
133	Trousers Drill 39	39-40 40-41 41-42 42-43 43-44 44-45 45-46	Pair " " " " " "	21,034 397,995 4,011,369 6,090,802 1,664,413 616,497 ... 12,802,110	2-15 2-39 2-55 2-80 3-90 4-09	0-45 9-51 102-48 170-96 64-98 25-24 ... 373-62	... ... ... ... ... ... ...

1	2	3	4	5	6	7	8	9
134	Overall Combination	39-40 40-41 41-42 42-43 43-44 44-45 45-46	Each " " " " "	917,016 2,609,403 3,787,415 1,060,360 750,156	4.53 4.17 4.41 5.43 6.12	41.51 108.89 167.24 57.63 45.90	...	
135	Shirts Mazri Pow	39-40 40-41 41-42 42-43 43-44 44-45 45-46	Each " " " " "	99,345 2,823,510 1,960,574 1,561,368 996	0.99 1.01 1.24 2.07 1.77	0.98 28.64 24.32 32.40 1.76	...	
136	Great coats Pow Officers	39-40 40-41 41-42 42-43 43-44 44-45 45-46	Each " " " " "	10,000 1,216 N. M.	11.80 16.95	1.18 0.21	...	
137	Jacket Mazri-Pow	39-40 40-41 41-42 42-43 43-44 44-45 45-46	Each " " " " "	19,972 1,395,739 803,638 29,176 N. M.	1.22 1.30 1.57 2.01	0.24 18.16 12.59 0.59	...	
138	Shirts Mazri Pow	39-40 40-41 41-42 42-43 43-44 44-45 45-46	Pair " " " " "	33,765 1,588,530 706,135 155,519 N. M.	0.79 0.85 0.84 1.69	0.27 13.45 5.95 2.63	...	

139	Trousers Mazri Pow	39-40 40-41 41-42 42-43 43-44 44-45 45-46	Pair " " " " " "	16,931 1,244,996 886,582 55,536 N. M. ...	1-34 1-39 1-57 1-65	... 0-23 17-27 13-91 0-92	...
140	Great coats O. R.'s Pow	44-45 45-46	Each "	17,280 ...	15-34 ...	2-65 ...	...
141	Set Parachute "x" type MK- IA (India) Parachute Silk 28, dia.	39-40 40-41 41-42 42-43 43-44 44-45 45-46	Each " " " " " "	 5,599 ... 10,984 ...	 639-30 ... 857-71 ...	 35-79 ... 94-21 ...	...
				16,683		130-00	...
142	E. D. Parachute Cotton Com. 18, diameter.	39-40 40-41 41-42 42-43 43-44 44-45 45-46	Each " " " " " "	7,632 4,72,594 24,95,462 ...	36-80 52-87 48-40 ...	2-81 249-86 1207-72 ...	1460-39
				29,75,688			
143	Parachute Silk E. D. 28' dia.	39-40 40-41 41-42 42-43 43-44 44-45 45-46	Each " " " " " "	8,073 1,171 ...	817-77 854-33 ...	66-02 10-00 ...	76-02
				9,244			

1	2	3	4	5	6	7	8	9
144	Pack Parachute Mk. VI	39-40 40-41 41-42 42-43 43-44 44-45 45-46	Each " " " " "	214,363 481,000	4.84 4.29	10.39 20.66		
145	Pack Parachute Mk. VI-A.	39-40 40-41 41-42 42-43 43-44 44-45 45-46	Each " " " " "	580,730	2.57	14.93		
146	Overall combination O. G.	44-45 45-46	Each "	807,240	8.95	56.0827		
147	Capes Waterproof No. 2 (O. G.)	43-44 44-45 45-46	" " "	201,897 1,644,015	12.53 11.03	25.33 170.8468		
148	Shorts Drill Olive Green	44-45 45-46	Pair	1352,728	3.66	49.5243		
149	B. D. Drill Trousers O. G.	43-44 44-45 45-46	" " "	16,75,595 56,97,537	5.33 5.39	89.36 306.8936		
150	Trousers K. D. 1942	44-45 45-46	" "	50,50,006	3.78	190.9665		
151	Nets Bush Nets	42-43 43-44 44-45 45-46	Each " " "	673,915 801,243 329,006	4.12 5.18 5.74	27.79 41.49 18.8941		
152	Nets Mosquito Universal Sandfly.	44-45 45-46	" "	327,583	9.27	30.3706		
153	Shirts Cotton Khaki Cell. U/S A. with convertible collars.	44-45 45-46	" "	91,847	4.35	3.9935		

154	Battle-dress Blouses Cellular O. G.	43-44 44-45 45-46	"	336,737	3.59	12.07
155	Shirts Bush O. G.	44-45 45-46	"	3,045,921	385	117.2466
156	Suits Onepiece working U. S. A.	43-44 44-45 45-46	"	163,525 142,541	7.83 8.51	12.80 12.1397
157	Shirts Milly. Khaki Australian Patk.	44-45 45-46	"	248,574	4.10	10.2080
158	Coats Warm Followers	44-45 45-46	"	113,703	10.37	11.7860
159	Capes Antigas	44-45 45-46	Each	452,051	10.30	46.5543
160	Shirts Bush R. A. F.	44-45 45-46	"	583,746	3.48	20.3205
161	Trousers D. K. R. A. F.	44-45 45-46	Pair	496,469	4.40	21.8210
162	Shirts Combination Tropical	43-44 45-46	Each	452,411	4.71	21.34
163	Shirts Cotton Blue Grey	43-44 45-46	"	402,055	3.59	14.44
164	B. D. Blouses Cotton Green	43-44 45-46	"	1,317,756	3.63	44.97
165	Gloves Mobile Bath unit	43-44 45-46	Pair	1,593,885	1.12	17.84
166	Trousers C. K., U. S. A.	43-44 45-46	"	228,250	5.01	11.43
167	B. D. Blouses O. G.	43-44 44-45 45-46	Each	2,110,842 3,861,088	3.59 3.58	75.82 138.3188
168	Capes Antigas Light No. 1	43-44 45-46	"	784,321	9.96	78.09

1	2	3	4	5	6	7	8	9
169	Shirts Mazri Officers . . .	43-44 45-46	"	593,271	1-79	10-63		
170	Shirts Mazri Recruits . . .	42-43 43-44 45-46	Each " Pair	1,171,694 1,887,509	1-62 2-18	19-03 41-23		
171	Shorts Mazri Recruits . . .	42-43 43-44 45-46	"	1,480,692 1,417,920	1-21 1-66	17-95 23-57		
172	Capes Antigas No. 1 (green) . . .	43-44 45-46	Each "	97,342	10-95	10-66		
173	B. D. Trousers Drill Green (1943)	43-44 45-46	Pair	2,130,307	5-24	111-70		
174	Shirts Heavy Union Grey . . .	41-42 42-43 43-44 45-46	Each " " "	403,091 370,701 753,088	3-61 3-43 3-46	14-57 12-71 26-08		
175	Shirts Heavy Union Khaki . . .	41-42 42-43 43-44 45-46	" " " "	362,127 291,029 807,723	3-54 3-81 3-55	12-80 11-09 28-70		
176	Nets Sandfly Bivouac . . .	43-44	"	160,452	11-90	19-11		
177	Trousers K. D. Special . . .	42-43	Pair	447,180	3-01	13-45		
178	Shorts K. D. Australian Patt. . .	42-43 45-46	"	1133,505	2-10	23-78		
179	Jackets Antigas Light No. 1 . . .	42-43 45-46	Each "	310,677	4-65	14-46		
180	Trousers Hospital Drill Blue . . .	42-43 45-46	Pair "	386,780	2-67	10-33		

		42-43	44-45	46-47	48-49	50-51	52-53	54-55	56-57	58-59	60-61	62-63	64-65	66-67	68-69	70-71	72-73	74-75	76-77	78-79	80-81	82-83	84-85	86-87	88-89	90-91	92-93	94-95	96-97	98-99	100-101	102-103	104-105	106-107	108-109	110-111	112-113	114-115	116-117	118-119	120-121	122-123	124-125	126-127	128-129	130-131	132-133	134-135	136-137	138-139	140-141	142-143	144-145	146-147	148-149	150-151	152-153	154-155	156-157	158-159	160-161	162-163	164-165	166-167	168-169	170-171	172-173	174-175	176-177	178-179	180-181	182-183	184-185	186-187	188-189	190-191	192-193	194-195	196-197	198-199	200-201	202-203	204-205	206-207	208-209	210-211	212-213	214-215	216-217	218-219	220-221	222-223	224-225	226-227	228-229	230-231	232-233	234-235	236-237	238-239	240-241	242-243	244-245	246-247	248-249	250-251	252-253	254-255	256-257	258-259	260-261	262-263	264-265	266-267	268-269	270-271	272-273	274-275	276-277	278-279	280-281	282-283	284-285	286-287	288-289	290-291	292-293	294-295	296-297	298-299	300-301	302-303	304-305	306-307	308-309	310-311	312-313	314-315	316-317	318-319	320-321	322-323	324-325	326-327	328-329	330-331	332-333	334-335	336-337	338-339	340-341	342-343	344-345	346-347	348-349	350-351	352-353	354-355	356-357	358-359	360-361	362-363	364-365	366-367	368-369	370-371	372-373	374-375	376-377	378-379	380-381	382-383	384-385	386-387	388-389	390-391	392-393	394-395	396-397	398-399	400-401	402-403	404-405	406-407	408-409	410-411	412-413	414-415	416-417	418-419	420-421	422-423	424-425	426-427	428-429	430-431	432-433	434-435	436-437	438-439	440-441	442-443	444-445	446-447	448-449	450-451	452-453	454-455	456-457	458-459	460-461	462-463	464-465	466-467	468-469	470-471	472-473	474-475	476-477	478-479	480-481	482-483	484-485	486-487	488-489	490-491	492-493	494-495	496-497	498-499	500-501	502-503	504-505	506-507	508-509	510-511	512-513	514-515	516-517	518-519	520-521	522-523	524-525	526-527	528-529	530-531	532-533	534-535	536-537	538-539	540-541	542-543	544-545	546-547	548-549	550-551	552-553	554-555	556-557	558-559	560-561	562-563	564-565	566-567	568-569	570-571	572-573	574-575	576-577	578-579	580-581	582-583	584-585	586-587	588-589	590-591	592-593	594-595	596-597	598-599	600-601	602-603	604-605	606-607	608-609	610-611	612-613	614-615	616-617	618-619	620-621	622-623	624-625	626-627	628-629	630-631	632-633	634-635	636-637	638-639	640-641	642-643	644-645	646-647	648-649	650-651	652-653	654-655	656-657	658-659	660-661	662-663	664-665	666-667	668-669	670-671	672-673	674-675	676-677	678-679	680-681	682-683	684-685	686-687	688-689	690-691	692-693	694-695	696-697	698-699	700-701	702-703	704-705	706-707	708-709	710-711	712-713	714-715	716-717	718-719	720-721	722-723	724-725	726-727	728-729	730-731	732-733	734-735	736-737	738-739	740-741	742-743	744-745	746-747	748-749	750-751	752-753	754-755	756-757	758-759	760-761	762-763	764-765	766-767	768-769	770-771	772-773	774-775	776-777	778-779	780-781	782-783	784-785	786-787	788-789	790-791	792-793	794-795	796-797	798-799	800-801	802-803	804-805	806-807	808-809	810-811	812-813	814-815	816-817	818-819	820-821	822-823	824-825	826-827	828-829	830-831	832-833	834-835	836-837	838-839	840-841	842-843	844-845	846-847	848-849	850-851	852-853	854-855	856-857	858-859	860-861	862-863	864-865	866-867	868-869	870-871	872-873	874-875	876-877	878-879	880-881	882-883	884-885	886-887	888-889	890-891	892-893	894-895	896-897	898-899	900-901	902-903	904-905	906-907	908-909	910-911	912-913	914-915	916-917	918-919	920-921	922-923	924-925	926-927	928-929	930-931	932-933	934-935	936-937	938-939	940-941	942-943	944-945	946-947	948-949	950-951	952-953	954-955	956-957	958-959	960-961	962-963	964-965	966-967	968-969	970-971	972-973	974-975	976-977	978-979	980-981	982-983	984-985	986-987	988-989	990-991	992-993	994-995	996-997	998-999	1000-1001	1002-1003	1004-1005	1006-1007	1008-1009	1010-1011	1012-1013	1014-1015	1016-1017	1018-1019	1020-1021	1022-1023	1024-1025	1026-1027	1028-1029	1030-1031	1032-1033	1034-1035	1036-1037	1038-1039	1040-1041	1042-1043	1044-1045	1046-1047	1048-1049	1050-1051	1052-1053	1054-1055	1056-1057	1058-1059	1060-1061	1062-1063	1064-1065	1066-1067	1068-1069	1070-1071	1072-1073	1074-1075	1076-1077	1078-1079	1080-1081	1082-1083	1084-1085	1086-1087	1088-1089	1090-1091	1092-1093	1094-1095	1096-1097	1098-1099	1100-1101	1102-1103	1104-1105	1106-1107	1108-1109	1110-1111	1112-1113	1114-1115	1116-1117	1118-1119	1120-1121	1122-1123	1124-1125	1126-1127	1128-1129	1130-1131	1132-1133	1134-1135	1136-1137	1138-1139	1140-1141	1142-1143	1144-1145	1146-1147	1148-1149	1150-1151	1152-1153	1154-1155	1156-1157	1158-1159	1160-1161	1162-1163	1164-1165	1166-1167	1168-1169	1170-1171	1172-1173	1174-1175	1176-1177	1178-1179	1180-1181	1182-1183	1184-1185	1186-1187	1188-1189	1190-1191	1192-1193	1194-1195	1196-1197	1198-1199	1200-1201	1202-1203	1204-1205	1206-1207	1208-1209	1210-1211	1212-1213	1214-1215	1216-1217	1218-1219	1220-1221	1222-1223	1224-1225	1226-1227	1228-1229	1230-1231	1232-1233	1234-1235	1236-1237	1238-1239	1240-1241	1242-1243	1244-1245	1246-1247	1248-1249	1250-1251	1252-1253	1254-1255	1256-1257	1258-1259	1260-1261	1262-1263	1264-1265	1266-1267	1268-1269	1270-1271	1272-1273	1274-1275	1276-1277	1278-1279	1280-1281	1282-1283	1284-1285	1286-1287	1288-1289	1290-1291	1292-1293	1294-1295	1296-1297	1298-1299	1300-1301	1302-1303	1304-1305	1306-1307	1308-1309	1310-1311	1312-1313	1314-1315	1316-1317	1318-1319	1320-1321	1322-1323	1324-1325	1326-1327	1328-1329	1330-1331	1332-1333	1334-1335	1336-1337	1338-1339	1340-1341	1342-1343	1344-1345	1346-1347	1348-1349	1350-1351	1352-1353	1354-1355	1356-1357	1358-1359	1360-1361	1362-1363	1364-1365	1366-1367	1368-1369	1370-1371	1372-1373	1374-1375	1376-1377	1378-1379	1380-1381	1382-1383	1384-1385	1386-1387	1388-1389	1390-1391	1392-1393	1394-1395	1396-1397	1398-1399	1400-1401	1402-1403	1404-1405	1406-1407	1408-1409	1410-1411	1412-1413	1414-1415	1416-1417	1418-1419	1420-1421	1422-1423	1424-1425	1426-1427	1428-1429	1430-1431	1432-1433	1434-1435	1436-1437	1438-1439	1440-1441	1442-1443	1444-1445	1446-1447	1448-1449	1450-1451	1452-1453	1454-1455	1456-1457	1458-1459	1460-1461	1462-1463	1464-1465	1466-1467	1468-1469	1470-1471	1472-1473	1474-1475	1476-1477	1478-1479	1480-1481	1482-1483	1484-1485	1486-1487	1488-1489	1490-1491	1492-1493	1494-1495	1496-1497	1498-1499	1500-1501	1502-1503	1504-1505	1506-1507	1508-1509	1510-1511	1512-1513	1514-1515	1516-1517	1518-1519	1520-1521	1522-1523	1524-1525	1526-1527	1528-1529	1530-1531	1532-1533	1534-1535	1536-1537	1538-1539	1540-1541	1542-1543	1544-1545	1546-1547	1548-1549	1550-1551	1552-1553	1554-1555	1556-1557	1558-1559	1560-1561	1562-1563	1564-1565	1566-1567	1568-1569	1570-1571	1572-1573	1574-1575	1576-1577	1578-1579	1580-1581	1582-1583	1584-1585	1586-1587	1588-1589	1590-1591	1592-1593	1594-1595	1596-1597	1598-1599	1600-1601	1602-1603	1604-1605	1606-1607	1608-1609	1610-1611	1612-1613	1614-1615	1616-1617	1618-1619	1620-1621	1622-1623	1624-1625	1626-1627	1628-1629	1630-1631	1632-1633	1634-1635	1636-1637	1638-1639	1640-1641	1642-1643	1644-1645	1646-1647	1648-1649	1650-1651	1652-1653	1654-1655	1656-1657	1658-1659	1660-1661	1662-1663	1664-1665	1666-1667	1668-1669	1670-1671	1672-1673	1674-1675	1676-1677	1678-1679	1680-1681	1682-1683	1684-1685	1686-1687	1688-1689	1690-1691	1692-1693	1694-1695	1696-1697	1698-1699	1700-1701	1702-1703	1704-1705	1706-1707	1708-1709	1710-1711	1712-1713	1714-1715	1716-1717	1718-1719	1720-1721	1722-1723	1724-1725	1726-1727	1728-1729	1730-1731	1732-1733	1734-1735	1736-1737	1738-1739	1740-1741	1742-1743	1744-1745	1746-1747	1748-1749	1750-1751	1752-1753	1754-1755	1756-1757	1758-1759	1760-1761	1762-1763	1764-1765	1766-1767	1768-1769	1770-1771	1772-1773	1774-1775	1776-1777	1778-1779	1780-1781	1782-1783	1784-1785	1786-1787	1788-1789	1790-1791	1792-1793	1794-1795	1796-1797	1798-1799	1800-1801	1802-1803	1804-1805	1806-1807	1808-1809	1810-1811	1812-1813	1814-1815	1816-1817	1818-1819	1820-1821	1822-1823	1824-1825	1826-1827	1828-1829	1830-1831	1832-1833	1834-1835	1836-1837	1838-1839	1840-1841	1842-1843	1844-1845	1846-1847	1848-1849	1850-1851	1852-1853	1854-1855	1856-1857	1858-1859	1860-1861	1862-1863	1864-1865	1866-1867	1868-1869	1870-1871	1872-1873	1874-1875	1876-1877	1878-1879	1880-1881	1882-1883	1884-1885	1886-1887	1888-1889	1890-1891	1892-1893	1894-1895	1896-1897	1898-1899	1900-1901	1902-1903	1904-1905	1906-1907	1908-1909	1910-1911	1912-1913	1914-1915	1916-1917	1918-1919	1920-1921	1922-1923	1924-1925	1926-1927	1928-1929	1930-1931	1932-1933	1934-1935	1936-1937	1938-1939	1940-1941	1942-1943	1944-1945	1946-1947	1948-1949	1950-1951	1952-1953	19
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1	2	3	4	5	6	7	8	9
196	Shirts Cotton Twill striped	42-43 43-44 45-46	Each " "	1,616,560 787,884	1.25 1.41	20.16 11.14	...	

FACTORY ITEMS

C.—Harness and Saddlery Items

NOTE.—The values are expressed in lakhs.

197	Chaguis Universal	39-40 40-41 41-42 42-43 43-44 44-45	Each	...	...	...	...	...
				491,677	1.13	5.56	...	...
				2665,806	1.00	26.69	...	...
				3036,365	0.91	27.65	...	...
				192,387	1.19	2.28	...	...
198	Respirator Antigas Haversacks Mk. VI.	39-40 40-41 41-42 42-43 43-44 44-45	Each	...	...	...	...	...
				114,044	3.56	4.06	...	...
				518,652	3.41	17.72	...	...
				877,928	3.33	29.24	...	...
				162,656	3.15	5.13	...	...
				58,703	3.23	1.90	...	...
199	Respirator Antigas Haversacks Mk. VII	39-40 40-41 41-42 42-43 43-44 44-45	Each	...	...	...	...	...
				...	...	...	...	...
				415,152	2.82	11.72	...	...
				2053,324	3.18	65.31	...	...
				482,961	3.21	15.50	...	...
200	Seaboard Bayonet No. I Mk. III	39-40 40-41 41-42 42-43 43-44 44-45	Each	...	...	...	...	...
				...	...	...	...	...
				322,635	1.93	6.21	...	...
				207,476	2.80	5.81	...	...
				74,867	2.38	1.78	...	...
				105,186	3.43	3.61	...	...

201	Seaboard Bayonet No. I Mk. II	39-40 40-41 41-42 42-43 43-44 44-45	Each	No Manu- facture. 20,142 No Manu- facture. 80,000 No Manu- facture. ,, Not	Manufactured Do. Do. No Manu- facture. No Manu- facture.	2.26 .. 2.23	0.69 .. 1.79 .. .. ..	.. .. .. .. .. ..
202	Covers Waterproof 32' x 16' Mk. II.	39-40 40-41 41-42 42-43 43-44 44-45	Each	2,000	Manufactured Do. Do. No Manu- facture. No Manu- facture.	150.31 3.01	..	..
203	Covers waterproof 40' x 40' Mk. II.	39-40 40-41 41-42 42-43 43-44 44-45	Each	1,172 18,549 33,107 55,941 20,230	.. 286.79 327.67 342.61 467.47 452.62	3.36 60.78 113.43 261.51 91.56	.. .. .. .. .. ..	.. .. .. .. .. ..
204	Covers Waterproof 24' x 16' Mk. II.	39-40 40-41 41-42 42-43 43-44 44-45	Each	128,999 848 26,600 67,327 17,530 72,938	.. 55.52 69.49 87.16 110.17 118.38	530.64 .. .. .. .. ..	.. .. .. .. .. ..	.. .. .. .. .. ..
205	Covers Waterproof 12' x 8' Mk. II.	39-40 40-41 41-42 42-43 43-44 44-45	Each	185,243 76,129 68,203 57,333 24,352	Not Manufactured Ditto. 24.30 26.03 24.85 27.36	183.30 18.26 17.75 14.25 8.66	.. .. .. .. .. ..	.. .. .. .. .. ..
				225,017		56.92		

1	2	3	4	5	6	7	8	9
206	Covers Waterproof $6\frac{1}{2}' \times 6\frac{1}{2}'$ Mk. II.	39-40 40-41 41-42 42-43 43-44 44-45	Each " " " " "	90,910 4,690 2,157 11,413 109,070	Not Manuf- actured. 11-18 11-52 12-05 13-59	10-16 .53 .26 1-55 12-60		
207	Covers Waterproof $5\frac{1}{2}' \times 3'10''$ Mk. II.	39-40 40-41 41-42 42-43 43-44 44-45	Each " " " " "	17,500 18,819 152,121 211,877 20,310 3,758 424,385	7-61 6-83 5-95 6-37 7-83 10-41	1-33 1-29 9-06 13-50 1-59 -39 27-16		
208	Covers Waterproof $18' \times 12'$ Mk. II.	39-40 40-41 41-42 42-43 43-44 44-45	Each " " " " "	2,721 3,353 59,625 61,331 59,628 175,238 361,794	35-60 46-84 46-53 50-36 66-41 67-66	.97 1-57 27-70 30-89 39-60 118-57 219-30		
209	Belt Waist W. E. Patt. 37 Small	41-42 42-43 43-44	Each " "	470,101 1030,570 908,252	2-47 1-86 1-68	11-6163903 19-1886978 15-2773633		
210	Haversacks W. E. Patt. 37 all ranks (all web).	41-42 42-43	Each "	579,243 751,726	3-45 2-75	20-0126886 20-6714413		
211	Pouches Basic W. E. Patt. 37	41-42 42-43	Each "	513,582 556,255	2-79 2-24	14-3153155 12-4631299		

212	Packs W. E. & Patt. 08 (all web)	41-42 42-43	Each "	554,906 901,486	3-21 3-09	17-7928889 27-8287088
213	Respirator Antigas Haversacks Mk. VII	42-43 43-44	Each "	540,434 961,539	2-60 3-10	14-0674575 29-8404696
214	Covers Antigas Animal Mule Mk. I.	44-45	Each	88,714	23-90	21-2004923
215	Set Container Mk. VII webbing Set Mk. VII (2 Straps)	44-45	Each	913,205	5-62	51-3092508
216	Trough Canvas 350 galls. body.	42-43	Each	29,692	56-61	16-8102051
217	Haversack all runks	43-44	Each	1753,833	2-33	40-7021261
218	Pouches Basic	43-44	Each	1076,641	1-43	15-3782101
219	Pack (all web)	43-44 44-45	Each "	1205,304 390,846	2-65 3-77	34-3762070 14-7441506
220	Set Container	43-44	Each	102,624	18-82	19-3124572
221	Battle Dress Anklets size I.	43-44	Each	260,501	4-55	11-8489829
222	Battle Dress Anklets size II.	43-44	Each	379,145	4-86	18-4144277
223	Battle Dress Anklets size III.	43-44	Each	300,000	4-45	13-3646365
224	Respirator Antigas Haversacks Mk. II.	44-45	Each	376,284	4-31	16-2236849
225	Cistern Water Canvas 'S' type (1,350 gallons).	44-45	Each	13,672	162-98	22-2823333
226	Set Container Mk. V-A.	43-44 44-45	Each "	112,638 614,418	20-93 11-87	23-57869 72-9039153
227	Pouches Basic Mk. VIII.	44-45	Each	818,787	2-02	16-5797907
228	Cistern water canvas 'S' type 50 galls Mk. I.	44-45	Each	63,720	22-08	14-0732121

1	2	3	4	5	6	7	8	9
229	Battle Dress Anklets Web Size No. 2.	44-45	Each	856,855	2 43	20-8545887		
230	Container Canvas Type S.D.B.	44-45	Each	99,580	13-03	12-9756262		
231	Covers W.P. 24' x 16' Mk. II.	43-44 44-45	Each "	8,244 12,635	140-79 131-84	11-60692 16-52802		
232	Covers W. P. 18' x 12' Mk. II.	44-45	Each	31,097	65-10	20-24465		
233	Buckets Water Canvas Mk. V.	42-43	Each	935,135	1-14	10-64641		
234	Web Equipment	41-42 42-43 43-44 44-45 45-46	Sets " " " "	440 2,194 1,581 5653-9* 5170-8	15 12 0 19 10 0 19 10 0	69 431 310 99-73 80-60		*This represents the total quantity of different items which make up the web equipment sets but were supplied as individual items.
				15039.7		990-33		

COTTON TEXTILES (OTHER THAN FACTORY PRODUCTION).

NOTE 1.—Quantities have been expressed in thousands and values in lakhs of rupees.

NOTE 2.—Changes in prices in many cases are due to changes in specifications.

NOTE 3.—(a) Prices vary with type and size—No representative rate can be given.
(b) Rates not given as the quantities are in composite units.

235	Cases Palissade Tent.	41-42 42-43 45-46	Nos.	1,519	3 0 0	46
236	Cases Barrack	42-43 43-44	Nos.	885 860	4 0 0 ..	36 11

Life Jacket	41-42 42-43 43-44 44-45 45-46	Nos. " " " "	79 167 304 247 210	4.1 4.64 4.59 3.70 3.70	3 8 14 7.8 7.0	39.8
			1,007			
238 Anklets Web	40-41 41-42 42-43	Prs. " "	648 3,970 9,032	1.28 .94 .97	8 37 88	
239 Ground Sheets	40-41 41-42 42-43 43-44 44-45 45-46	Nos. " " " " "	787 1,810 3,744 285 117 831	6.1 5.1 5.0 6.2 7 7 0 7 7 0	48 82 187 18 8.7 61.8	415.5
240 Sheets and Dressings	39-40 40-41 41-42 42-43 43-44 44-45 45-46	Nos. Yds. " " " " "	7,574 123 103 1,295 1,126 1,722 11,952 3,000 1,612 734 3,554 1,259 3,907 384	(b) (b) (b) (b) (b) (b) (b) (b) (b) (b) (b) (b) (b)	2 27 87 72 71 138 145.5	542.5
			15,213 15,558			

244	Durries	40-41	Nos. sq. yds.	335	*	4	..
		41-42	15	15	1.6	9	..
		42-43	572	572	1.9	5	..
		43-44	278	278	2.8	15	..
		44-45	546	546	2.11 0	2.5	..
			111	111			
		45-46	1,640	1,640	2.11 9	43.0	79.07
			22	22	2.11 0	0.57	
			1,864	1,864			
			1,655	1,655			
245	Cotton Waste.	39-40	73	73	15.34	11.25	..
		40-41	153	153	24.10	36.79	..
		41-42	327	327	20.16	65.99	..
		42-43	98	98	22.60	22.23	..
		43-44	144	144	22.50	32.33	..
		44-45	204	204	19.10	39.09	..
		45-46	285	285	24.06	59.99	267.07
			1,284	1,284			
246	Cotton Wool	39-40	146	146	.66	1	..
		40-41	2,718	2,718	.68	19	..
		41-42	3,908	3,908	.55	21	..
		42-43	2,212	2,212	.55	12	..
		43-44	406	406	.30	2	..
		44-45	2,465	2,465	0.15-0	22	..
		45-46	232	232	0.14-6	2	79
			12,087	12,087			
247	Cotton Tent Components (Flies, Walls, etc.).	39-40	176	176	(a)	100	..
		40-41	1,488	1,488	"	679	..
		41-42	2,230	2,230	"	945	..
		42-43	2,110	2,110	"	1,473	..
		43-44	1,571	1,571	"	1,577	..
		44-45	1,334	1,334	"	1,313	..
		45-46	813	813	"	883	6,970
			9,712	9,712			

1	2	3	4	5	6	7	8	9
248	Tents Bivovac, flies	41-42 42-43 43-44 44-45 45-46 (April- December)	Nos. " " " "	117 227 380 435 33 1,192	45.6 34.2	53 78 126.78 160.00 10.00	 417.78	
249	Tents Components—Jute	39-40 40-41 41-42 42-43 43-44 44-45 45-46	Nos. " " " " " "	91 591 1,339 1,743 372 650 45 4,831	(a)	3 11 27 41 6 12.5 3.5	 104.0	
250	Flannelette for rifle cleaning	39-40 40-41 41-42 42-43 43-44 44-45 45-46	Doz. Yds. " " " " "	773 674 3,958 6,974 6,365 3,183 1,870 23,797	.4 .4 .5 .6	3 3 20 47 37 26 15	 161	
251	Badges of various types, titles, chevrons and station labels.	44-45 45-46 (April- January).	Nos. "	34,753 1,875 36,628	(a) "	7.25 1.91	7.25 9.16	

252	Braces	44-45	Nos.	2,583	(a)	11.3	11.3
253	Loongs (Handloom) (7½ yds. each).	44-45	Nos.	835	7.1	65	11.3
		45-46	"	715	7.5	60	115
		(April—January).		1,550			
54	Loongs (Powerloom)	45-46	Yds.	12,591	.53	64	..
255	Mattresses	(April—January).	Nos.	61	4.0-6	2.49	24.95
		44-45	"	20	10.15-4	22.46	
		45-46		81			
256	Razais	41-42	Nos.	47	4.13-3	2.26	7.72
		44-45	"	200	2.11-9	5.46	
				247			
257	Lint Cotton	40-41	Nos.	998	1.4-2	11.85	..
		41-42	"	664	1.6-2½	8.48	..
		42-43	"	1,053	1.8-11½	15.06	..
		43-44	"	405	2.6-3	8.28	..
		44-45	"	289	2.12-3	7.32	62.21
		45-46	"	397	2.11-0	11.22	
				3,806			
258	Cotton Blankets	41-42	Nos.	53	2.8-0	1.62	..
		42-43	"	190	2.10-2½	5.54	..
		43-44	"	339	2.12-8½	9.49	..
		44-45	"	68	1.12-8	1.23	18.10
		45-46	"	9	2.7-4½	0.22	
				659			
259	Kapok for filling other than life jackets.	42-43	Nos.	1,684	0.10-4	11	..
		43-44	"	232	0.11-4	1.65	..
		44-45	"	520	0.9-3	3.00	16.61
		45-46	"	131	0.11-9	0.96	
				2,567			
260	Cases Belster Tents.	41-42	..	440	0.13-5	4.0	..

WOOLLEN TEXTILES (Other than factory production).

NOTE 1.—Quantities have been expressed in thousand and values in lakhs of rupees.

NOTE 2.—The figures for 1945-46 are generally for the period April to December.

NOTE 3.—Changes in price in many cases are due to changes in specifications.

1	2	3	4	5	6	7	8	9
261	Socks Woollen	39-40 40-41 41-42 42-43 43-44 44-45 45-46	Pairs " " " " " "	661 3,347 7,357 13,167 6,150 11,061 6,587 48,330	1-15-0 1-15-0 1-15-0 1-15-0 1-15-0 1-2-6 1-2-6	12-8 64-8 142-5 255-1 119-2 127-9 776-2 1498-5	..	
262	Vests Woollen	39-40 40-41 41-42 42-43 43-44 44-45 45-46	Nos. " " " " " "	65 651 1,205 1,780 1,269 839 634 6,453	2-10-0 2-10-0 2-10-0 2-8-0 2-8-0 2-10-3 2-10-3	1-7 16-1 31-6 44-7 31-7 22-1 16-8 164-7		
263	Drawers Woollen	39-40 40-41 41-42 42-43 43-44 44-45 45-46	Nos. " " " " " "	62 470 884 1,908 399 968 655 5,346	2-10-0 2-10-0 2-10-0 2-6-0 2-6-0 3-2-6 3-2-6	1-6 12-3 23-2 45-3 9-5 30-6 20-7 143-2		

264	Jerseys Woolen	39-40 40-41 41-42 42-43 43-44 44-45 45-46	Nos. " " " " " "	41 539 499 1,363 1,558 1,201 283 5,484	4 12 0 4 12 0 4 10 0 4 6 0 4 6 0 4 10 0 4 10 0 247.0	2.0 26.6 23.1 59.6 68.1 55.5 13.1 247.0
265	Hose Tops	39-40 40-41 41-42 42-43 43-44 44-45	Pairs " " " " "	37 668 2,767 2,213 3,102 8,787	0 15 0 0 15 0 0 15 0 0 13 0 0 13 0 76.7	0.3 6.3 25.9 18.0 25.2 76.7
266	Gloves Knitted	39-40 40-41 41-42 42-43 43-44 44-45 45-46	Pairs " " " " " "	8 384 1,413 1,165 610 893 431 4,904	1 0 0 1 0 0 1 0 0 1 0 0 1 0 0 1 0 0 1 0 0 49.0	0.1 3.8 14.1 11.7 6.1 8.9 4.3 49.0
267	Cap Comforters	39-40 40-41 41-42 42-43 43-44 44-45	Nos. " " " " "	88 150 749 957 917 510 3,371	0 11 0 0 11 0 0 11 0 0 11 0 0 11 0 0 13 3 23.8	0.6 1.0 5.1 6.6 6.3 4.2 23.8

1	2	3	4	5	6	7	8	9
269	Putties Knitted	39-40 40-41 41-42 42-43 43-44 44-45 45-46	Pairs " " " " "	13. 265 788 138 74 112 284 1,674	3 4 0 3 4 0 3 4 0 3 5 0 3 5 0 3 7 0 3 7 0 1 1 5	0.4 8.6 25.6 4.6 2.5 3.8 9.8 55.3		
269	Putties Woven	40-41 41-42 42-43 43-44	Pairs " " "	104 313 418 109 1,044	2 14 0 2 14 0 3 0 0 3 0 0 34.4	3.9 11.7 12.5 6.3 34.4		
270	Blankets Bawack	40-41 41-42 42-43 43-44 44-45 45-46	Nos. " " " " "	796 2,389 3,186 3,197 2,451 1,482 13,501 Jute	6 13 0 6 13 0 6 11 0 7 12 0 10 12 0 6 12 0 1,101	54 163 213 248 263 160 1,101		
271	Sand Bags	39-40 40-41 41-42 42-43	Nos. " " "	Per 720,635 181,403 420,182 345,182 1,667,402	100 bags 10 8 0 10 8 0 12 4 0 11 8 0 1,922	793 187 555 387 1,922		

Notes.—1 and 3 as above.
 Note. 2.—The figures for 1945-46 are generally for the period April to January.

272	Hessian Bags	40-41 41-42 42-43 43-44 44-45 45-46	Nos.	2,097 4,942 14,925 3,944 24,890 16,095 66,893	22 8 0 35 6 3 26 8 0 25 1 0 40 3 0 40 2 8	3 18 43 10 91 60	*For type generally purchased during the year.
273	Hessian Cloth.	39-40 40-41 41-42 42-43 43-44 44-45 45-46	Yds.	66,725 27,993 168,556 42,475 185,760 96,490 16,795 604,794	†Per 100 yds. 17 0 6 16 8 0 21 0 0 21 0 0 28 12 0 27 0 0 29 0 0	103 43 355 73 418 243 39	†For 40"/10½" os. which is the major store supplied.
274	Serim Hessian Strips	40-41 41-42 42-43 43-44	Yds.	225,974 1,020,124 2,149,168 3,395,266 9,412 10,506 3,695 Insignificant 23,613	‡ Per 100 yds. 2 2 0 2 2 0 1 13 0 14 14 0 13 3 0 12 0 0	51 251 504	‡ For 2" dyed. The other sizes supplied is 3" for which rate may be correspondingly in- creased.
275	Serim Hessian Cloth	41-42 42-43 43-44 44-45	Yds.	3,395,266 9,412 10,506 3,695 Insignificant 23,613	14 14 0 13 3 0 12 0 0	14 14 4	
276	"A" Twills Bags;	39-40 40-41 41-42 42-43 43-44 44-45 45-46	Nos.	612 2,185 7,909 7,687 13,612 17,616 13,908 63,429	Per 100 bags\$ 31 0 0 27 0 0 33 0 0 38 8 0 53 9 0 54 1 0 53 8 0	2 6 25 28 67 98 74	§For 30" x 26½" which is the major store supplied.
						226 1,373 806 32 300	

1	2	3	4	5	6	7	8	9
284	Chaplin, Frontier Pattern	41-42 42-43 43-44 44-45 45-46	Prs. " " " "	32 438 1,753 2,616 472	3 3 11 3 14 10 4 7 10 5 6 11 5 9 8	1 17 79 142 E 26		
285	Sandals	41-42 43-43 43-44 44-45 45-46	Prs. " " " "	5,311 303 254 3 2 ...	4 3 0 3 13 7 5 14 7 4 10 8 ...	13 10 0.17 0.11 ...	265	
286	Shoes Black Leather R. A. F. and Navy Pattern.	40-41 41-42 42-43 43-44 44-45 45-46	Prs. " " " " "	562 10 77 279 604 431 118	7 15 0 6 13 11 7 10 5 7 9 8 7 15 0 9 6 7	1 5 21 46 34 11	23.28	
287	Half Soles	39-40 40-41 41-42 42-43 43-44 44-45 45-46	Prs. " " " " "	1,519 724 1,768 2,979 2,258 1,724 552 756	0 13 2 1 3 3 1 2 0 1 3 0 1 2 6 1 3 0 1 1 7	6 21 34 27 20 7 8	118	
288	Gloves, M.T.	40-41 41-42 42-43 43-44 44-45 45-46	Prs. " " " " "	10,761 70 290 152 808 2 4	2 14 0 2 3 0 2 0 9 2 10 0 2 12 0 3 8 2	3 6 3 21 0.05 0.15	138	32.30

289	Jerkins Leather	39-40 40-41 41-42 42-43 43-44 44-45 45-46	Nos.	37 7 350 766 157 34 44	5 12 11 4 2 1 4 9 10 3 11 7 3 8 1 4 3 7 7 10 10	2.16 0.28 16.14 28.53 5.77 1.44 3.35	57.67
290	Coats, Poshtin	41-42 42-43 43-44 44-45	Nos.	1,395 17 88 43 1	26 6 0 32 9 8 23 0 6 26 3 0	5 29 12 0.16	46.16
291	T. G. Huttings	39-40 40-41 41-42 42-43 43-44 44-45 45-46	Nos.	149 ENGINEERING. 0.661 2,518 0.746 0.085 1.012 0.800 0.100	7,300 (average)	53 205 49 5 50 54.2 250.7	666.9
292	Poles Hamilton (Telegraph)	41-42 42-43 43-44 44-45	Nos.	5,922 54 ... 220 246	(average) 10/-	5.0 ... 22.0 9.6	30.6
293	Bolts, Nut and Rivets of sizes.	39-40 40-41 41-42 42-43 43-44 44-45 45-46	Tons	520 0.5 0.8 3.1 3.2 6.4 6.6 ...	... ... ... ... ... ... ...	31 32 64 1.5 ...	128.5

1	2	3	4	5	6	7	8	9
294	Pumps, Lifts and Forces— various kinds.	41—42 42—43 43—44 44—45 45—46	Nos. " " " "	11.91 11.71 0.51 ... 24.13	...	11 10 1 3.13 1.74	26.87	
295	Pickets Angle—various sizes	40—41 41—42 42—43 43—44	Nos. " " "	9,612 4,590 3,839 2,699 20,740	...	97 38 30 8	173	
296	Nissen Huts—Single	40—41 41—42 42—43 43—44	Nos. " " "	4.04 11.95 0.55 9.48 26.02	465/- (average) ...	18 52 3 48	121	
297	Nissen Huts—Twin	41—42 42—43 43—44 44—45 45—46	Nos. " " " "	2.16 1.22 1.09 ... 10.90 15.37	Rs. 5,480/- (average) ...	121 70 54 137.15 69.55	451.70	
298	Decauville Rails	39—40 40—41 41—42 42—43 43—44 44—45	Tons. " " " " "	0.73 8.77 13.45 8.70 15.80 0.90 48.35	Average Rs. 172.12-0	1 15 23 15 29 2.32	85.32	

299	Tip Wagons, Flat Wagons, etc., Decauville.	40-41 41-42 42-43 43-44 44-45 45-46	Nos. " " " " "	1-65 3-09 2-66 5-79 1-60 0-04 14-73	10 20 57 8-71 0-26	100-97
300	Rails—Standard Gauge	40-41 41-42 42-43 43-44 44-45 45-46	Tons. " " " " "	33-28 27-36 62-00 7-20 11-50 0-40 141-74	49 38 92 12 3-1 0-26	199-97
301	Pipes and Fittings all types	39-40 40-41 41-42 42-43 43-44 44-45 45-46	Miles " " " " " "	8 8 8 8 8 8 8	10-45 55-6 13-74	79-79

ENGINEERING STORES.

NOTE 1*to 3.—As above.
NOTE 4 (a).—Indicates that prices vary with type and size; no representative rate can be given.

302	A. C. Sheets and Accessories	39-40 40-41 41-42 42-43 43-44 44-45 45-46	Tons. " " " " " "	0-7 20-5 41-8 52-1 39-5 57-7 31-9 244-5	Rs. A. P. 204 15 2 189-11 10 184 15 10 131 0 1 111 0 0 122 0 0 147 0 0	1 39 77 68 44 70 47 346
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1	2	3	4	5	6	7	8
303	Shovels	40-41 41-42 42-43 43-44	Each " " "	366 2,804 617 831	2 6 3 2 7 1 2 10 5 3 0 0	9 88 16 25	
304	Pick Axes	39-40 40-41 41-42 42-43 43-44 44-45 45-46	Nos. " " " " " "	55 202 1,998 548 506 70.8 7.0	1 10 7 1 2 5 0 13 9 1 11 0 1 3 2	1 2 17 9 6 0.93 0.05	35.98
305	Electric Lamps, various makes and Volta.	39-40 40-41 41-42 42-43 43-44 44-45 45-46	Nos. " " " " " "	3,386.8 798 1,285 1,479 1,598 1,288 43.2 32.2	(a) " " " " " "	6.0 11.0 13.0 13.0 15.0 6.62 3.84	68.46
306	Electric Fan, Table and Ceiling	39-40 40-41 41-42 42-43 43-44 44-45 45-46	Nos. " " " " " "	6,532.4 10 32 40 48 47 8.9 32.8 218.7	(a) " " " " " "	8 29 40 50 50 8.61 37.50	284.11

307	Electric Wires and Cable various sizes.	39-40 40-41 41-42 42-43 43-44 44-45 45-46	Yds.	5,494 7,993 9,987 23,582 15,616 1,458.4 162.3 64,292.7	(a)	16 20 61 53 58 10.81 2.90	221.71
308	Electric Copper Wire various sizes.	39-40 40-41 41-42 42-43 43-44 44-45 45-46	Tons.	0.35 2.86 4.14 13.10 6.40 6.80 0.68 34.33	(a)	3 36 72 171 90 137.15 5.99	515.14
309	Batteries & Cells, various sizes and types.	39-40 40-41 41-42 42-43 43-44 44-45 45-46	Nos.	15 26. 44.01 40.02 57.04 0.80 0.10 182.97	(a)	2 3 572 520 741 43.65 30.85	1,912.50
310	Insulators and Fittings (various sizes).	39-40 40-41 41-42 42-43 43-44 44-45 45-46	Nos.	611 1,251 3,830 5,436 5,787 10,717 3,393 31,025	(a)	2 4 15 18 25 12.04 6.69	82.73

1	2	3	4	5	6	7	8	9
311	Fly Proof—wire gauze	39—40 40—41 41—42 42—43 43—44	Sq. Ft.	4,465	(a)	28.0		
312	Mosquito Proof—wire gauze	39—40 40—41 41—42 42—43 43—44	Sq. Ft.	318	(a)	14		
313	Cement	39—40 40—41 41—42 42—43 43—44 44—45 45—46	Tons.	28.0 65.0 204.8 851.1 1,231.3 1,509.2 504.0 4,394.0	24 0 0 25 8 0 27 0 0 28 8 0 33 0 0* 47 0 0* 42 0 0*	9 21 68 281 411 617 212	1,619	
314	Paints	40—41 41—42 42—43 43—44 44—45 45—46	Cwt.	2.4 179.8 166.0 153.0 346.8 236.5 1,084.5	6 0 0 6 8 0 8 0 0 9 0 0 7 8 0 7 8 0	1 71 81 84 156 111	504	
315	Enamels	41—42 42—43 43—44 44—45 45—46	Gallons	94.1 285.0 85.7 81.4 136.0 682.2	5 10 0 7 0 0 8 0 0 10 0 0 10 0 0	6 20 6 8 13.6	17.6	

*As the rates varied during these periods average rates have been indicated.

316	Varnishes	41-42 42-43 43-44 44-45 45-46	Gallons	146.3 660.0 153.9 219.3 118.0 1,297.5	3 6 0 4 4 0 6 0 0 6 0 0 6 0 0	8 29 9 13 8	67.0
317	Road Tar	39-40 40-41 41-42 42-43 43-44 44-45 45-46	Tons.	7.8 9.7 12.1 23.7 16.5 16.8 8.9 ^a 95.0	116.5 119.9 131.2 124.0 120.8 144.0 147.5	9 12 16 29 20 21 15	192
318	Bitumen	40-41 41-42 42-43 43-44 Calendar year-44 Calendar year-45		13.058 17.160 32.919 101.367 186.871 174.688 526.058	... ... ... ... ... ...	19.20 31.34 79.07 255.79 437.63 373.26	1,196.29
319	Hammers (various kinds)	39-40 40-41 41-42 42-43 43-44 44-45 45-46	Nos.	22 163 735 841 183 2.9 1.4 1,948.3	... ... ... ... ... ... ...	1 4 18 21 4 0.07 0.02	48.09

1	2	3	4	5	6	7	8	9
320	Drills—various	40—41 41—42 42—43 43—44 44—45 45—46	Nos. " " " " "	207 299 352 186 10.2 0.8 1,025.0	...	2 5 5 3 0.2 0.06	15.26	
321	Vices—various types	40—41 41—42 42—43 43—44 44—45 45—46	Nos. " " " " "	15.0 82.0 66.0 21.0 .. 6.6 190.6	..	2.0 7.0 13.0 4.0 .. 1.5	27.5	
322	Jacks Lifting, traversing lase Hydraulic.	42—43 43—44 44—45 45—46	Nos. " " "	4.44 8.16 1.90 0.07 14.57	195 245 ..	9 20 1.27 0.05	30.32	

SHIPBUILDING

NOTE 1.—As above.

NOTE 2.—Changes in price in many cases are due to changes in specifications.

323	"Z" Crafts and Fabrication Nos. of component parts.	40—41 41—42 42—43 43—44 44—45	Nos " " " "	0.070 0.034 .. 0.100 0.204	9,600,000 ..	43 58 .. 33	124	
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324	Basest Tridler	40-41 41-42 42-43 44-45 45-46	Nos " " 44	0.017 0.021 0.005 0.040	3,98,177 4,07,571 5,00,000	68 86 25 0.61	170.61
325	Admiralty Floating Docks	43-44	Nos.	0.083 0.003		314	314

VEHICLES

NOTE 1.—As above.
 NOTE 2.—Figures for 1945-46 indicate vehicles chassis already delivered and expected to be delivered by the end of March, 1946.
 NOTE 3.—Rates of representative types have been given.

326	Vehicles and Chassis (landing, clearance and assembly charges B. P. C. orders.)	42-43 43-44 44-45 45-46	Nos " " "	36.8 42.6 61.5 47.5	341 347 370 461	122 162 316 199	799
327	Vehicles and Chassis (landing clearance and assembly charges including the cost of chassis). India Orders.	39-40 40-41 41-42 42-43 43-44 44-45	Nos " " " " "	4.2 10.6 34.4 14.7 1.4 65.3	 6,900 (average)	139 380 1,212 701 89	2,521
328	F. A. Tractors, Bodies (Fabrication).	41-42 42-43	Nos. "	348 272		24 19	43
329	Vehicles and lorry bodies, (fabrication charges only).	40-41 41-42 42-43 43-44 44-45 45-46	Nos. " " " " "	0.620 9.7 29.7 38.3 62.3 50.3 26.02 216.32	.. .. .. .. .. ..	65 213 316 572 503 292	1,961

1	2	3	4	5	6	7	8	9
330	Touring Attachments.	40-41 41-42 42-43 43-44 44-45	Nos.	7.3 7.7 14.06 9.8 10.0	60 82 70 80 70	4 5 10 8 7		
331	Armoured Vehicles (Fabrication)	41-42 42-43 43-44	Nos.	48.86 1.291 2.049 1.463	6,431 (average)	24 61 164 84		
332	Armoured Car Mk. III	42-43	Each	4.803 0.208	15,883.77	33.03824	39.08824	
333	Armoured Ambulance I. P. Mk. I Bodies to be built on Ford Chassis.	43-44	Each	0.119	19,380.96	23.06384	23.06384	
334	Pontoon Mk. V—end	44-45	Each	0.668	4,383.21	29.27985	29.27985	
335	Pontoon Centre Mk. I	44-45	Each	0.401	4,354.70	17.46233	17.46233	

TIMBER.

NOTE:—1.—The quantities have been expressed in thousands and values in lakhs of Rupees.

NOTE:—2.—The figures for 1945-46 are for the period April to February.

NOTE:—3.—Changes in price in many cases are due to changes in specifications.

336	Timber—General purposes	39-40 40-41 41-42 42-43 43-44 44-45 45-46	Tons	2900	92 3 0 107 13 0 111 11 6 114 1 0 133 9 6 133 9 6	3030	3030
				2900			

1	2	3	4	5	6	7	8	9
342	Tents I. P. Officers Mk. II Poles Standing.	39-40	Nos.	...	...	...	...	...
343	Tents I. P. Officers 160 lbs. Poles—Ridge.	39-40	Nos.	...	...	...	...	...
344	Tents I. P. Private Poles stand- ing.	39-40	Nos.	...	...	...	...	...

MISCELLANEOUS GROUP

345	Camouflage Nets.	41-42 42-43 43-44	Nos. " "	2,305 3,734 208	6 8 0 5 12 0 16 9 0	199 359 19	577	
346	Pitch hats.	42-43 43-44	Nos. "	6,247 1,420 238	1 12 0 2 6 3	24 5	29	
347	Sisal Rope of Sizes.	42-43 43-44 44-45 45-46	Cwts. " " "	1,658 36.8 66.8 105.6 63.7	...	38.5 30.6 47.1 29.4	145.6	* Prices vary with type and size. No. repre- sentative rate can be given.
348	Hemp Rope of Sizes.	41-42 42-43 43-44 44-45 45-46	Cwts. " " " "	322.9 6.2 47.4 19.2 35.7 12.7 121.2	...	1.6 13.7 6.0 13.8 5.1	40.2	* Prices vary with type and size. No representative rate can be given.

249	Jute Rope of Sizes . . .	41-42 42-43 43-44 44-45 45-46	Cwts " " " "	1-2 31-1 116-0 106-4 28-8	*	0-3 14-5 48-9 47-3 15-5	128-5
350	Matting Coir . . .	41-42 42-43 43-44 44-45 45-46	Sq. Yds. " " " "	Insignificant " 1,883 1,918 2,025	0 12 4 0 14 9 1 2 10	16 24	60-0
351	Camouflage Screens Coir . . .	43-44	Sq. Yds.	5,826 7,050 7,050	0 5 6	25	25
352	Tents—Components made of Tarpaulins.	39-40	Nos.		*		
353	Tents—Components made of Coir.	41-42 42-43 43-44 44-45	Nos. " " "	330 1,645 1,106 287		8 16 13 550	587
354	Dubbin Protective . . .	43-44 44-45	Lbs. " "	3,368 1,007 2,000	1 7 0 1 6 0	14 27	41
355	Lifts . . .	40-41 41-42 42-43 43-44 44-45 45-46	Prs. " " " " "	1,122 8,358 7,347 6,549 2,194 284	0 3 0 0 2 6 0 2 10 0 3 0 0 3 0 0 2 5	2 13 13 12 4 0.84	44-84
356	Shoes, Canvas Rubber sole . . .	41-42 42-43 43-44 44-45 45-46	Prs. " " " "	25,854 3,940 10,214 5,678 6,409 925	0 14 04 0 14 89 1 3 7 1 5 0 1 5 7	36 94 69.5 85.0 12.0	206-5

*Prices vary with type and size. No representative rate can be given.

*Prices vary with type and size. No representative rate can be given.

1	2	3	4	5	6	7	8	9
357	Tips Boot Heal	40-41 41-42 42-43 43-44 44-45 45-46	Prs. " " " " "	2,194 4,655 13,085 8,992 3,812 548	0 4 0 0 3 7 0 2 1 0 1 9 0 1 2 0 2 5	6 10 17 10 3 1		
				33,286			47.0	
358	Laces Leather	40-41 41-42 42-43 43-44 44-45 45-46	Prs. " " " " "	2,106 6,488 7,712 6,611 1,568 1,445	0 1 2 0 0 8 0 1 2 0 1 10 0 1 8 0 4 0	1 5 6 6 1 4	23	
				25,880				
359	Tips Boot Toe	40-41 41-42 42-43 43-44 44-45 45-46	Prs. " " " " "	2,478 6,939 9,611 7,297 5,142 1,061	0 1 7 0 1 7 0 1 1 0 1 0 0 0 9 0 0 9	2 7 7 5 2 0.47	23.47	
				32,528				
360	Boots Moquito, R.A.F.	43-44 44-45 45-46	Prs. " "	60 50 105	9 0 0 9 10 3 9 6 10	5 5 10	20	
				215				
361	Tips Filling	40-41 41-42 42-43 43-44 44-45 45-46	Prs. " " " " "	1,375 1,977 3,686 1,101 2,324 1,049	0 2 8 0 3 4 0 2 5 0 2 5 0 2 4 0 2 8	2 4 6 2 3 2	19	
				11,512				

362	Eyebits Brass (Various sizes)	40-41 41-42 42-43 43-44 44-45 45-46	Gross	234 477 454 221 18 47 1,451				4-97 9-17 12-36 5-52 0-80 2-07	34-89
363	Snap fasteners (imported)	40-41 42-43 44-45	Gross	15 30 39 84		13 0 0 13 0 0 8 6 0		1-95 3-90 3-27	3-12
364	Snap Fasteners	40-41 41-42 42-43	Gross	6,864 16 13,000 19,880		*		470-69 1-72 1-68	474-03
365	Knives Clasp	40-41 41-42 42-43 43-44 44-45 45-46	Nos.	510 522 88 416 500 731 2,767		1 11 5 1 6 9 7 1 10 0 1 8 9 1 8 0 1 7 9		9 7 13 6 8 10	53
366	Cooking Ranges for 100 persons	42-43 43-44 44-45 45-46	Nos.	2,164 0-236 1-325 4-8 8-525		865 15 9 855 14 11 629 6 11 651 10 8		19 2-02 8-34 31-28	60-64
367	Cycles	40-41 41-42 42-43 43-44 45-46	Nos.	2-6 4-0 6-2 13-13 3-5 29-43		87 0 0 88 0 0 99 0 0 126 0 0 103 0 0		2 4 6 16-19 3-58	31-77

*No representative rate can be given, as the quantities shown include complete sets as well as components.

1	2	3	4	5	6	7	8	9
368	Ovens Field	39-40 40-41 41-42 42-43 43-44 44-45 45-46	Each " " " " "	Not Manufactured. 656 787 1,628 Not Manufactured. " " 3,071	355.24 367.09 307.02	2.33 2.89 5.00	10.22	
369	Drum and Containers all types	39-40 40-41 41-42 42-43 43-44 44-45 45-46	Nos. " " " " " "	60 949 871 9,403 1,165.5 815.0 13,363.5	1 7 9 1 10 8 1 9 9 0 13 6	1 16 14 79.00 23.72 17.70	150.42	
370	Fire Extinguishers	40-41 41-42 42-43 43-44 44-45 45-46	Nos. " " " " "	64 205 146 189 810.2 2.0 1,416.2	40 10 0 30 12 0 31 11 0 31 12 0	26 83 46 60 61.33 0.50	256.83	
371	Refills for Fire Extinguishers	40-41 41-42 42-43 43-44 44-45 45-46	Nos. " " " " "	75 415 670 70 643.2 60.5 1,933.7	2 8 6 2 0 4 1 14 1 1 9 3	2 8 13 1 8.37 0.61	32.98	

No.	Description	Nos.	40-41 41-42 42-43 43-44	Nos.	500 1,759 943 42 2.4 3,306.4	Nos.	1 1 0 1 0 6 0 10 4 1 2 3	Nos.	4 32 11 2	Nos.	43.94
372	Goggles & Spectacles		40-41 41-42 42-43 43-44								
373	Tins Mess Mk. II		40-41 41-42 42-43 43-44								
374	Barrows Wheel		41-42 42-43 43-44 44-45 45-46								
375	Utensils Cooking—various sizes and kinds.		39-40 40-41 41-42 42-43 43-44 44-45 45-46								
376	Scientific instruments and optical stores, various kinds & lamps brazing.		41-42 42-43 43-44 44-45 45-46								

1	2	3	4	5	6	7	8	9
377	Water Cisterns under 400 gallons.	39-40 40-41 41-42 42-43 43-44	Nos. " " " "	0.34 1.22 16.57 2.68 3.21 <u>24.02</u>	350 0 0	84	34	
378	Washing Soap	39-40 40-41 41-42 42-43 43-44 44-45 45-46	Bars " " " " " "	2,533 8,188 8,204 14,984 2,905 35,132 3,169	18 10 0 18 13 0 19 2 0 38 12 0 40 0 0 60 0 0 58 8 0	5 15 16 58 12 210 18		
379	Stoves	41-42 42-43 43-44 44-45 45-46	Nos. " " " "	75,115 34 34 24 1 0.7		6 6 4 0.19 0.11	394	
380	Cases Carrying	40-41 41-42 42-43 43-44 44-45 45-46	Nos. " " " " "	93.7 5.5 17.2 50.5 50.1		5 16 48 47	16.30	
381	Blow Lamps	40-41 41-42 42-43 43-44	Nos. " " "	123.3 5 21 45 29 100	20 0 0 23 12 11 26 10 5 24 2 2	1 5 12 7	116	25

382	Drugs & Medicines	41-42 42-43 43-44 44-45 45-46	... ... ... ... ...	58 25,630 19,762 23,485 18,302	48 84 69 54	255
383	Dressings & Bandages	41-42 42-43 43-44 44-45 45-46	Millions " " " "	87,297 372 27,244 19,712 15,329 16,691	... 165 336 107 178	846
384	Surgical & Medical Instruments	41-42 42-43 43-44 44-45 45-46	Nos. " " " "	79,348 30 2,023 1,429 1,616 1,359	... 20 20 25 17	82
385	Surgical & Medical Appliances	41-42 42-43 43-44 44-45 45-46	Nos. " " " "	6,457 20 2,674 1,833 2,554 1,887	... 27 20 23 19	89
				8,968		

APPENDIX IV

BREAKDOWN OF SUPPLY EXPENDITURE (INITIALLY CHARGED TO DEFENCE ESTIMATE (OLD MAIN HEADS) EXCLUDING CAPITAL AND TRANSPORTATION CHARGES UNDER OLD MAIN HEAD 7) BY CATEGORIES OF STORES.

	1939-40	1940-41	1941-42	1942-43	1943-44	1944-45	1945-46 (1st 10 months)	Total
I. MUNITIONS—								
(a) Ordnance Factories . . .	3.69	4.31	6.83	10.34	13.46	13.06	9.29	60.98
(b) Civil Production, including component. . .	...	32	4.55	7.94	8.17	5.49	1.58	28.05
II. ENGINEERING AND TRANSPORTATION.								
(a) Engineering Stores . . .	26	5.41	15.26	13.28	18.75	28.17	18.42	99.55
(b) Transportation Stores . . .	...	79	2.92	4.99	2.87	3.89	2.90	18.35
III. VEHICLES AND M. T. STORES—								
(a) Purchase of Vehicles and fabrication of A. F. V. . .	1.23	6.88	16.77	10.41	29.53	8.71	5.54	79.12
(b) M. T. stores including tyres . .	10	46	2.53	6.05	15.60	6.59	4.22	35.58
IV. CLOTHING AND ORDNANCE—								
(a) Clothing Factories . . .	...	5.45	17.05	27.98	27.04	37.62	16.22	1,31.36
(b) Clothing Stores . . .	1.08	6.59	17.20	32.33	24.37	42.36	30.81	1,54.74
(c) H. and S. Factories . . .	...	2.77	8.39	13.13	11.49	9.74	6.85	52.37
(d) Ordnance Stores . . .	96	15.35	32.71	57.45	52.13	14.50	8.73	1,81.83

	1939-40	1940-41	1941-42	1942-43	1943-44	1944-45	1945-46 (1st 10 months)	Total
V. TEXTILES—	...	49	2,12	5,16	4,62	2,75	34	15,48
VI. TIMBER—	...	1,40	3,46	6,46	11,58	13,84	6,67	43,41
VII. PETROL, OIL AND LUBRICANTS—	61	1,65	4,82	*8,15	34,41	67,30	52,23	1,69,17
VIII. FOOD—	2,01	5,43	16,09	38,34	87,79	86,82	55,64	2,92,17
IX. MEDICAL—								
(a) Medical Workshops	1	1	3	4	1	...	...	10
(b) Medical Stores	33	1,17	3,02	3,80	1,36	33	73	10,74
X. SHIPBUILDING AND REPAIRS—								
(a) New construction and repairs	...	1	56	1,20	2,15	2,17	1,88	7,97
(b) Naval Stores	5	88	64	1,80	1,84	2,10	1,09	8,40
XI. AERONAUTICAL STORES—								
(a) Aircraft Repairs	...	...	...	...	1,84	3,70	1,25	6,79
(b) Aviation Stores	1	1	9	32	75	74	47	2,39
XII. OTHER STORES—	39	3,95	6,56	6,37	11,51	13,61	12,36	54,75
TOTAL	10,73	63,38	1,61,63	2,55,54	3,61,32	3,63,49	2,37,22	14,53,31

*Excludes Customs Duty on motor and aviation spirit.

APPENDIX (V)
**PRODUCTION OF SCIENTIFIC AND OPTICAL INSTRUMENTS, ANTI-GAS RESPIRATORS, ENGINEERS' STORES, SIGNAL EQUIPMENT AND
 ARMY CLOTHING IN INDIA.**

	Unit	1939 (Sept.-Dec.)	1940	1941	1942	1943	1944	1945 (Jan.-Aug.)	Total
SCIENTIFIC AND OPTICAL INSTRUMENTS—	Nos.								
Binoculars	"	..	..	1,171	3,963	6,487	5,506	2,597	19,724
Telescopes	"	..	..	132	317	170	528	115	1,262
Protractor	"	..	..	499	4,834	8,143	4,553	3,182	21,211
Others	"	..	..	..	249	1,454	17,225	18,334	37,262
ANTI-GAS RESPIRATORS	Thousands	..	142	238	320	316	..	..	1,016
ENGINEERS' STORES—									
Barbed wire	Tons	897	2,132	4,793	5,805	5,428	267	..	..
ARMY SIGNAL EQUIPMENT—									
Lines of communication cables. {	Thousands miles of single cable.	27	27	27	67	87	80	..	..
Telephones	Nos.	3,542	2,224	6,381	4,724	7,732	7,710	..	..
ARMY CLOTHING—									
Battledress blouses or trousers.	Thousands	..	606	1,590	3,018	13,662	17,780	..	..
Khaki drill trousers	"	14	397	4,027	5,964	2,190	5,708	..	..
Shirts	"	304	4,851	12,772	14,657	4,739	4,416	..	..
Shorts	"	561	3,077	10,805	13,763	7,199	4,063	..	..
Ankle boots	Thousands	..	..	3,000	3,760	3,768	2,620	..	..
Other leather footwear	pairs	..	..	630	2,160	2,723	3,470	..	..

APPENDIX (VI)
PRODUCTION OF ARMS AND AMMUNITION IN INDIA

	Unit	1939-40 (Sept.—Mar.)	1940-41	1941-42	1942-43	1943-44	1944-45	1945-46 (Apr.—Aug.)	Total
ARMS AND AMMUNITION—									
Small Arms	Nos.	18,772	93,019	198,831	279,837	366,543	484,290	286,650	1,727,942
Artillery Ammunition	"	183,430	417,771	1,135,288	1,617,625	1,972,423	2,474,492	927,624	8,728,653
Mortar Ammunition, Grenades and Mines.	"	..	10,080	190,552	1,025,425	1,389,568	1,498,393	662,428	4,776,446
Small Arms Ammunition	Mill	77	152	203	222	204	116	6	980
Artillery Equipments	Nos.	97	206	348	468	417	1,376	134	3,046
R. A. F. Bombs (250 lbs. G. P.)	Nos.	..	..	..	..	885	878	..	1,763

APPENDIX VII
PRODUCTION OF SOME ESSENTIAL RAW MATERIALS IN INDIA

		Unit	1939	1940	1941	1942	1943	1944
Iron-ore	.	Tons. (000)	3,166	3,103	3,194	3,217	2,655	...
Pig-iron	.	"	1,757	1,994	2,010	1,830	1,749	1,423
Chromite	.	"	49	56	50	50	33	...
Petroleum	.	Gals. (000)	81,460	96,689	101,451	97,736	95,719	...
Bauxite	.	Tons. (000)	9	8	13	18	24	...
Graphite	.	Tons.	936	306	814	1,055	1,169	...
Magnesite	.	Tons. (000)	34	43	41	48	49	...
Manganese-ore	.	"	845	870	786	757	595	...
Mica	.	Cwts. (000)	140	150	185	186	160	...
Coal	.	Tons. (000)	27,769	29,338	29,363	29,352	25,698	26,035
Electricity	.	KWH. (Mills)	2,533	2,802	3,233	3,276	3,578	3,822
Cotton Yarn	.	Lbs. (Mills)	1,335	1,349	1,577	1,534	1,680	1,651

APPENDIX VIII
NUMBER AND TONNAGE OF VESSELS COMPLETED IN INDIA

Years	Number	Tonnage (thousand gross tons)
1942	55	17
1943	410	53
1944	1,199	79
1945 (Jan.—Nov.)	2,306	110

APPENDIX IX
ANALYSIS OF ALL-INDIA CLOTHING PRODUCTION BY YEARS

Year	Number of garments fabricated
1939 (September--December)	1,191,447
1940	12,039,532
1941	64,961,205
1942	105,829,967
1943	113,826,126
1944	69,042,386
1945	61,106,056
Grand Total	427,996,720

APPENDIX X
STATEMENT SHOWING THE NUMBER OF VEHICLES ASSEMBLED IN INDIA

Year	Chevrolet & Ford Chassis	Miscellaneous Makes	Total
1940	...	...	10,000
1941	34,645	...	34,645
1942	40,447	4,045	44,492
1943	67,863	18,748	86,611
1944	67,811	26,291	94,102
1945	61,784	12,134	73,918
		Grand Total	433,768

APPENDIX XI

STATEMENT SHOWING THE PURCHASES MADE BY EACH ORGANISATION IN THE DEPARTMENT OF SUPPLY (Value in rupees)

	1938-39	1939-40	1940-41	1941-42	1942-43	1943-44	1944-45
Indian Stores Department	87,711,415	289,297,577	554,375,339	...	...	...	...
Contracts Directorate	26,481,604	47,851,047	207,805,091	...	...	...	...
Chief Controller of Purchase (Supply).	...	...	...	871,575,360	1,013,225,666	628,261,472	71,77,55,542
Chief Controller of Purchase (Munitions).	...	...	...	456,673,036	1,519,285,597	412,972,080	44,45,96,871
Controller of Supplies, Cawnpore.	...	...	...	44,681,326	412,023,049	12,751,917	64,61,410
Directorate General, Shipbuilding & Repairs.	...	...	...	...	...	6,567,298	1,59,31,950
Cotton Textiles Directorate	...	...	...	415,503,890	828,085,640	*27,014,992	...
Controller of Supplies, Bombay.	...	...	...	27,457,927	49,831,858	9,175,528	1,66,93,471
Controller of Supplies, Calcutta.	...	...	...	...	1,856,338	50,989,518	7,63,45,381
Controller of Supplies, Karachi.	...	...	...	1,853,691	3,154,979	1,147,519	55,81,138
Controller of Supplies, Lahore.	...	...	...	10,490,219	36,716,536	814,485	...
Controller of Supplies, Madras.	...	...	...	2,501,840	11,562,873	10,734,159	1,14,70,625
Directorate General, Supply.	...	...	...	...	...	...	11,65,26,156
Directorate General, Munitions Production.	...	...	...	...	...	...	18,53,334
Directorate of Munitions Production, Bombay.	...	...	...	...	...	...	2,20,53,025
Directorate of Munitions Production, Lahore.	...	...	...	...	...	...	1,26,65,884
Deputy Controller of Supplies, Lahore.	...	...	...	...	...	...	16,76,666
Adviser on Jute Supplies, Calcutta.	...	...	...	...	...	...	83,53,959

*(from 1-4-1943 to 14-5-1943)

APPENDIX XII

STATEMENT SHOWING THE NUMBER OF CONTRACTS PLACED BY EACH ORGANISATION IN THE DEPARTMENT OF SUPPLY

	1938-39	1939-40	1940-41	1941-42	1942-43	1943-44	1944-45
Indian Stores Department	85,922	97,120	102,512	...	...	...	...
Contracts Directorate	3,067	5,650	15,690	...	...	...	...
Chief Controller of Purchase (Supply).	...	...	...	17,540	15,148	16,331	16,879
Chief Controller of Purchase (Munitions).	...	...	...	58,775	41,732	41,733	26,341
Controller of Supplies, Cawnpore.	...	...	...	3,290	2,723	1,538	1,098
Directorate General of Shipbuilding and Repairs.	...	...	...	...	...	406	475
Cotton Textiles Directorate	...	...	...	6,143	7,402	*595	...
Controller of Supplies, Bombay.	...	...	...	14,261	16,088	2,389	1,558
Controller of Supplies, Calcutta.	...	...	...	...	141	1,767	2,773
Controller of Supplies, Karachi.	...	...	...	1,682	716	467	916
Controller of Supplies, Lahore.	...	...	...	1,991	2,427	852	...
Controller of Supplies, Madras.	...	...	...	704	1,277	2,134	1,874
Directorate General, Supply	...	...	...	...	...	...	2,617
Directorate General, Munitions Production.	...	...	...	...	...	...	325
Directorate of Munitions Production, Bombay.	...	...	...	...	...	...	2,118
Directorate of Munitions Production, Lahore.	...	...	...	...	...	...	960
Deputy Controller of Supplies, Lahore.	...	...	...	...	...	...	655
Adviser on Jut, Supplies, Calcutta.	...	...	...	...	...	...	297

*(from 1-4-1943 to 14-5-1942)

APPENDIX XIII

STATEMENT SHOWING THE VALUE OF CONTRACTS PLACED BY THE SUPPLY DEPARTMENT IN INDIA.

Year	Value (in rupees)
	(in crores)
1938-39	11·4
1939-40 (September 1939 to March 1940 only)	28·7
1939-40	32·8
1940-41	81·1
1941-42	200·1
1942-43	261·3
1943-44	168·3
1944-45	145·7

APPENDIX XIV

STATEMENT SHOWING THE TOTAL NUMBER OF CONTRACTS PLACED BY THE SUPPLY DEPARTMENT IN INDIA.

Year	Total
1938-39	88,979
1939-40	102,770
1940-41	118,202
1941-42	103,486
1942-43	87,654
1943-44	68,575
1944-45	58,886

APPENDIX XV

STATEMENT SHOWING THE STRENGTH OF THE VARIOUS ORGANISATIONS IN THE DEPARTMENT OF SUPPLY ON V-J DAY.

	Gazetted	Ministerial	Inferior	Total
Main Secretariat	48	334	194	576
Directorates General of Supply and Disposals.	226	1,576	662	2,464
Directorate General of Munitions Production.	296	3,110	968	4,374
Directorate General of Shipbuilding and Repairs.	87	432	146	665
Directorate General of Aircraft . .	82	364	130	576
Steel Commissioner's office . . .	78	932	212	1,222
Chief Controller of Purchase (Supply).	68	950	329	1,347
Chief Controller of Purchase (Munitions).	89	989	319	1,397
Electrical Commissioner's office .	23	150	50	223
Coal Commissioner's office . . .	46	609	137	792
Director of Munitions Production, Bombay.	31	330	72	433
Director of Munitions Production, Lahore.	31	230	70	331
Chief Registration Officer . . .	4	45	29	78
Controllers of Supplies	136	1,249	543	1,928
Port Shipping Officers	16	437	87	540
Advisers to Government	2	...	...	2
Grand Total	1,263	11,737	3,948	16,948

APPENDIX XVI

EMPLOYMENT IN VARIOUS INDUSTRIES IN BRITISH INDIA.

	1939	1944
1. Iron and Steel smelting and Steel rolling mills .	40,790	58,487
2. Lead smelting and Lead rolling mills	262	1,011
3. Electricity Generation	7,091	9,829
4. Petroleum Refineries	2,981	3,884
5. Engineering general	50,346	138,153
6. Electrical Engineering	7,377	23,049
7. Shipbuilding and Engineering	18,534	33,647
8. Coach building and motor car repairing	6,824	23,645
9. Chemicals	4,750	16,641
10. Bone and Manures	4,562	2,795
11. Paints	1,792	3,447
12. Tanneries	5,595	14,821
13. Leather and Shoes	6,997	18,967
14. Paper Pulp	1,851	1,127
15. Saw Mills	4,455	16,694
16. Cement Lime and Potteries	13,088	17,578
17. Glass	8,934	21,656
18. Coal mining	201,989	255,364
19. Metalliferous (Mica, salt, stone and clay) Mines .	103,355	109,584
20. Bricks and Tiles	17,358	21,762
Grand Total .	508,931	792,141

APPENDIX (xvii).

LIST OF SENIOR OFFICERS PRINCIPALLY CONCERNED WITH THE PROBLEMS MENTIONED IN THE HISTORY.

Hon'ble Members.

The Hon'ble Sir Mohd. Zafarullah Khan, K.C.S.I., Hon'ble Member, Law and Supply (1939-41).

The Hon'ble Sir Homi Modi, K.B.E., (1941-43).

The Hon'ble Dewan Bahadur Sir A. Ramaswami Mudaliar, K.C.S.I., (1943-45).

The Hon'ble Sir A. A. Waugh, K.C.I.E., C.S.I., I.C.S., (1945-46).

Secretaries.

Sir E. M. Jenkins, K.C.I.E., C.S.I., I.C.S., (1940-43).

The Hon'ble Sir A. A. Waugh, K.C.I.E., C.S.I., I.C.S., (1943-45).

Mr. M. W. M. Yeatts, C.S.I., C.I.E., I.C.S., (1945-).

Additional Secretary.

Sir Ghulam Mohd., C.I.E., Additional Secretary (1941-42).

Joint Secretaries.

Mr. M. W. M. Yeatts, C.S.I., C.I.E., I.C.S., (1941-44).

Mr. J. A. Mackeown, C.I.E., I.C.S., (1942-45).

Mr. S. K. Kirpalani, C.I.E., I.C.S., (1941-43).

Mr. S. A. Venkataraman, C.I.E., I.C.S., (1942-45).

Mr. R. K. Nehru, I.C.S., (1942-44).

Mr. M. Ikramullah, C.I.E., I.C.S., (1944-46).

Mr. A. P. Hume, C.I.E., I.C.S., (1944-45).

Mr. J. M. Shrinagesh, C.I.E., I.C.S., (1945-46).

Mr. B. K. Patel, I.C.S., (1945-46).

Mr. M. P. Pai, I.C.S., (1945-).

Mr. J. B. Langford, O.B.E., I.C.S., (1945-).

Deputy Secretaries.

Mr. H. M. Patel, C.I.E., I.C.S., (1940-41).

Mr. H. M. Patel, C.I.E., I.C.S., (1940-41).

Mr. S. R. Zaman, C.I.E., I.C.S., (1940-41).

Mr. G. W. M. Whittle, O.B.E., I.C.S., (1941-).

Mr. S. Bhoothalingam, O.B.E., I.C.S., (1942-46).

Mr. M. R. Bhide, I.C.S., (1942-44).

Mr. C. N. Sharples, I.C.S., (1942-45).

Mr. A. T. Naqvi, O.B.E., I.C.S., (1943-46).

Mr. Akhtar Husain, I.C.S., (1943-46).

K. B. Kh. Obaidullah, O.B.E., (1942-44).

Mr. C. L. Contes, O.B.E., I.C.S., (1944-46).

Mr. P. R. Nayak, M.B.E., I.C.S., (1944-).

Mr. J. A. Rahim, I.C.S., (1944-45).

Mr. M. Ayub, M.B.E., I.C.S., (1944-46).

Mr. L. K. Jha, M.B.E., I.C.S., (1944-46).

Mr. W. G. Lamarque, I.C.S., (1945-).

Under Secretaries.

Mr. S. Bhoothalingam, O.B.E., I.C.S., (1940-41).

Mr. M. R. Bhide, I.C.S., (1941-42).

K. B. Kh. Obaidullah, O.B.E., (1941-42).

Mr. P. R. Nayak, M.B.E., I.C.S., (1941-43).

Mr. M. Ayub, M.B.E., I.C.S., (1942-44).

Mr. L. K. Jha, M.B.E., I.C.S., (1942-44).

Mr. W. G. Lamarque, I.C.S., (1944-45).

Rai Sahib S. C. Aggarwal, (1943-46).

Mr. M. B. L. Dar, (1943-45).

*Executive Officers.**Director-General.*

- Sir Guthrie Russell, K.C.I.E., Director-General, Munitions Production (1940—43).
 Major-General E. Wood, C.B., C.I.E., M.C., Director-General, Supply (1940—43), Director-General, Munitions Production (1943—45).
 Mr. A. R. Elliott Lockhart, C.I.E., Director-General, Munitions Production (1945-46).
 Sir Robert Targett, C.I.E., Director-General, Supply (1943—45).
 Vice Admiral R. R. Turner, C.B., D.S.O., R.N., Director-General, Shipbuilding and Repairs (1942—44).
 Vice Admiral C. Cantlie, C.B., D.S.O., R.N., Director-General, Shipbuilding & Repairs (1944-46).
 Sir James Pitkeathly, K.C.I.E., C.M.G., C.V.O., C.B.E., D.S.O., Director-General, Aircraft (1943-44).
 Air Vice Marshal O. E. Carter, C.B.E., A.F.C., R.A.F., Director-General, Aircraft (1944—46).

Iron and Steel Controller, etc.

- Mr. J. C. Mahindra, Iron and Steel Controller (1941—45).
 Mr. Frank Parr, Steel Commissioner, (1944-45), Steel Adviser to the Government of India (1945-46).
 Mr. E. G. Spooner, C.I.E., Iron and Steel Controller (1946—).

Coal Commissioner.

- Mr. P. C. Young, C.B.E., Coal Commissioner (1943-44).
Electrical Commissioner
 Mr. H. M. Mathews, C.I.E., Electrical Commissioner (1941—46).

Purchase Officers.

- Sir Kenneth Nicholson, M.C., Chief Controller of Purchase, (Munitions) (1941—45).
 Khan Bahadur A. G. Khan, C.I.E., Chief Controller of Purchase, (Munitions) (1945).
 Mr. K. G. Morshed, I.C.S., Chief Controller of Purchase (Supply), (1941—45).
 Mr. T. S. Pillay, O.B.E., Chief Controller of Purchase (Supply) (1943-45).
 Mr. G. T. Thadhani, O.B.E., Chief Controller of Purchase (Supply) (1945-46).
 Colonel P. J. Gibbs, O.B.E., Chief Administrative Officer (Purchase) (1941—43).
 Mr. B. B. Sarkar, I.C.S., Chief Administrative Officer (Purchase), (1943).

India Supply Mission.

- Sir R. K. Shanmukham Chetty, Head of the India Supply Mission in the U. S. A. (1941-42).
 Mr. K. C. Mahindra, Head of the India Supply Mission in the U. S. A. (1942—45).
 Mr. J. Vesugar, I.S.E., Head of the India Supply Mission in the U. S. A. (1945—).

BIBLIOGRAPHY.

A. OFFICE RECORDS, FILES AND REPORTS.

1. Files of Directorate General of Supply—Important files from various Directorates and Co-ordination.
2. Main Secretariat files—Important files from all Branches.
3. Main Secretariat Office Memoranda, Notes and Orders.
4. D.G.S. and D.G.M.P. office Memoranda, Administrative and Office Orders.
5. Different Reports submitted by various officers.
6. Pink Reports.
7. Important files on Industries from Reference & Record Section of the Information and Broadcasting Department.

B. PERIODICALS AND MAGAZINES.

1. Capital.
2. Commerce.
3. Eastern Economist.
4. Indian Finance.
5. Indian Information.
6. Illustrated Weekly of India.
7. Australasian Manufacturer.

C. BOOKS.

1. The Economics of Total War by H. W. Spiegel.
2. South Africa on Service—issued by South African Government.
3. Bulletin Nos. 1—12 issued by the Director General of Supplies, Union of South Africa.
4. The Union at War.
5. Supply in Modern War by Colonel G. C. Shaw.
6. India Arms for Victory by Tyson.
7. India's raw materials—published by Times of India Press.
8. Indian Hides and Skins—published by Times of India Press.
9. The Mineral Resources of India—published by Times of India Press.
10. The Jute Industry in India—published by Times of India Press.
11. Lac in India—published by Times of India Press.
12. Indian Glass Industry—published by Times of India Press.
13. The Indian Cotton Mill Industry—its potentialities.
14. Statistics relating to the War Effort of the U. K.
15. The Industrial Front—Canada.
16. Canada 1941.
17. Canada 1942.
18. Canada 1943.
19. Canada 1944.
20. Indian Economic Problems: Pre-war, War and Post-war, Vol. I, by Brij Narsin.
21. Indian Economic Problems: Pre-war, War and Post-war Vol. II, by Brij Narsin.
22. Industry's responsibility to the Community.
23. The organisation behind Torpedo Bomber Manufacture in Australia.
24. Supply Management and its relationship to Post-war Planning.
25. India builds her war economy by P. C. Jain.
26. Post-war Reconstruction in Britain.
27. Britain's Bill for Victory.
28. How India pays for the War by K. T. Shah.
29. New Zealand's war effort—two years' achievements.
30. New Zealand at War.
31. Britain's War Economy.

32. Planning for War and Peace by B. S. V. Stevens.
33. Re-construction—A report by the Federation of British Industries.
34. The Industrial Development of India by N. M. Pal.
35. Helping the People to help themselves—UNRRA.
36. Belgian Africa's Total War.
37. Economic Self-sufficiency by A. C. B. Fisher—Oxford Pamphlets on World Affairs.
38. Paying for the War by Geoffrey Crowther.
39. The Sinews of War by Geoffrey Crowther.
40. Post-war Industry and training in Management.
41. A picture of Britain.
42. Presidential address of J. C. Setalvad of the Federation of Indian Chambers of Commerce and Industry—1945.
43. Presidential address by the President of the All-India Manufacturers' Organisation—1945.
44. The Personal Factor in the Industrial Management.
45. Social Insurance and Allied Services—the Beveridge Report in brief.
46. Importance of effective personal management in Industry in War and Peace.
47. Apprenticeship and changing conditions in Industry.
48. Production Engineering Functions.
49. Some aspects of Australian Industrial Law.
50. The Development of Munitions Production in Australia.
51. Science and Industry in Peace and War.
52. Facts and Figures of Australia at War—September 1944.
53. The British Commonwealth and Empire.
54. Industrialisation and Trade by A. J. Brown.
55. Social Insurance—issued by the Minister of Reconstruction.
56. Agrarian Problems from the Baltic to the Aegean—issued by the Royal Institute of International Affairs.
57. Industrial Management—is it a Science or an Art?
58. The Reconciliation of Public and Private Enterprise.
59. The Institute of Industrial Management.
60. The work of the Industrial Psychologist.
61. Personnel Management.
62. Post-war Reconstruction in Britain issued by the Ministry of Information, Great Britain.
63. Food, War and the Future by E. Prentice.
64. British Industry by Compton and E. G. Bott.
65. Raw Materials—Information Department Papers No. 18A.
66. Australia—Official Hand Book.
67. Post-war Britain by Sir James Marchant.
68. Lend-Lease—Weapon for Victory—by Stettinius.
69. Reports to Congress on Lend-Lease Operations.
70. Review of prices and profits in Supply Department contracts by V. Narayanan.
71. Memorandum on the working of the Shipping Organisation in the Department of Supply.
72. History of the War Transport Department (July 1942 to October 1945).
73. Memoranda on Trade and Tariff Policy.
74. Report of the Technical Mission (Artificial Fertilisers).
75. Government Control in War by the Right Hon'ble Lord Hankey.

76. Transition to Peace Economy—Dr. P. S. Lokanathan.
77. Indian Economy during the War by L. C. Jain.
78. Report on Metallurgical and Engineering Industries by Dr. P. J. Thomas.
79. Reports on the Department of Industries for War Supplies (Directorate General of Supply) by Dr. P. J. Thomas.
80. The Location of Industry in India issued by the Economic Adviser to the Government of India.
81. War and Indian Economic Policy by D. R. Gadgil and S. V. Sovani.
82. Reports of the Public Accounts Committee for different years.
83. Liquidation of War Production by Kaplan.
84. Report of the American Technical Mission—1942.
85. Report on the Re-rolling Steel Mill Industry in India.
86. Indian Economy during the War by Rao.
87. Industrial Handbook—1919—issued by the Indian Munitions Board.
88. Industrial Problems of India edited by P. C. Jain.



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